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## THE "DISPERSIBLE" TUMORS OF THE FEMALE BREAST; WITH CASES.[1]

By Herbert Snow, M.D.,
SURGEON TO THE CANCER HOSPITAL, LONDON, ETC.

A very common question by hospital patients who apply with a "lump in the breast" is: "Whether this cannot be dispersed?" While it is needless to remark that such an aim is utterly impossible in the case of a cancerous growth, or that should we vainly essay for the latter merely tentative treatment, we shall only succeed in frittering away what may yet remain of the six or eight weeks period, within which alone modern surgery can reasonably guarantee a radical cure, yet I should like now to point out that a margin of instances numerically considerable yet exists, wherein recourse to the operator's knife is hardly ever necessary, and in which "dispersal" can be effected with no great difficulty.

Foremost of the latter is the tumor described in my works, by way of distinguishing it from the connective-tissue mammary growths of later life, as the "fibroma of adolescence." This is found only in the evolutionary period of the mamma, *i. e.*, from fourteen to twenty-five years of age. A young girl who wears a tight corset appears with the "lump" aforesaid, varying in degree from a scarcely perceptible thickening of the breast-tissue to a distinct, rounded, rather nodular tumor as large as a walnut. Often several of those are present, and both breasts are affected. The pain complained of varies greatly with the emotional

[1] A paper read in the Section of Surgery at the Bristol meeting of the British Medical Association, 1894.

tendencies of the girl; and also (in no small degree) with her frequent resort to tea-drinking. Commonly it exhibits an inverse ratio to the palpable magnitude of the tumor; it is always worst at the menstrual periods. Such growths are the necessary result of obstructed mammary development in early youth, and, so far as I am aware, occur only in a state of civilization. From the huge connective-tissue growths which appear during the decline and devolution of the mammary gland, *i. e.*, after the age of thirty-four, the "fibroma of adolescence" differs in not becoming associated with cyst-formation, an invariable sequel to the adeno-fibroma or cystic fibroma of middle age. The former generally yields to suitable management of hygienic and medicinal character; the latter is never cured, or even arrested, without a surgical operation.

The old rule *sublata causa, tollitur effectus*, while not absolute, yet has considerable significance in the case of an organ which, like the youthful mamma, has not yet completed its growth. The aberration of nutrition which produces these small fibrous hypertrophies of the breast-stroma appears largely due to direct pressure, but something must also be ascribed to indirect pressure-effects and to sympathy with the uterus, also struggling for unimpeded development. Moderate the injunctions of fashion in the matter of stays, tranquillize the nervous system, abolish tea, order some absorbent ointment, with *frequent* local friction, and the "lump" will vanish within a few weeks, seldom more than six. The application I generally prescribe is as follows: Pulv. plumbi iodidi, ʒj; lanoline, ʒvj; adipis ad, ℥j. This to be well rubbed in four times daily. Occasionally I have varied this with an ointment of green mercuric iodide, twenty grains to the ounce, employed night and morning; or have substituted two drachms of the (British Pharmacopœia) red iodide ointment for the same quantity of unguent. plumbi iodidi. With this, fifteen grains of bromide of potassium are taken internally at bedtime, to subdue the always present neurosis. Proceeding on this method, I have not found it necessary to subject any such case to operation since 1889 (*i. e.*, the patient being a young girl); and then surgical measures were resorted to only in consequence of the individual's impatience. To sear the mamma with multiple scars is a practice meriting emphatic condemnation, and even such an operation as Thomas's, designed to preclude subsequent marking, is hardly ever necessary. The following are cases in point, samples of many similar:

Case I.—Ada N., aged twenty-four years, single, seen July 17, 1893. At the upper part of the left breast an induration of the parenchyma forming a flattened nodular tumor one inch in diameter. After a single week's employment of the unguent. plumbi iodidi, with lanoline, there was only a slight trace of the "lump."

Case II.—Patty D., aged twenty-three years, single, seen January 15, 1894. To outer side of left nipple, flattened and indurated breast-tissue, constituting a "lump" one-half inch in diameter, one year's

duration; conspicuously tight stays. On the 22d nothing abnormal could be felt.

CASE III.—Annie E., aged twenty years, single, domestic servant. Mamma large; ill-defined hypertrophic induration of outer half of left breast, of four years' duration. Treatment from October 28, 1889, till November 25th, then no tumor and nothing abnormal could be found.

CASE IV.—Louisa Emily M., aged twenty-three years, single, shop-woman; out-patient April 28, 1890. At lower border of left breast a tumor the size of a hazelnut; noticed three years. Attendance till August 11th; then "perfectly cured." Has since married and borne two children; writes (December, 1893) to say she has had no further trouble.

CASE V.—Annie J., aged thirty-seven years, single; out-patient June 11, 1888. At the upper part of the left breast was a tumor of at least several years' duration, equal in size to a large walnut. Operation had been recommended by a cancer specialist. Under inunction by the lead iodide ointment thrice daily entire disappearance of the "lump" in seven weeks. Seen two years afterward; no further breast trouble.

CASE VI.—Ellen O'K., aged thirty years, married, no children; out-patient January 19, 1891. Hard nodule the size of a pea to outer side of each breast; left largest. Intermittent attendance (from Colchester) for several weeks. On June 1st no trace of either perceptible.

CASE VII.—Amelia B., aged twenty-four years, single. Nodule the size of a large pea deep in gland-tissue of left breast. Attendance from April 4 to May 21, 1887. Use of the iodide ointment thrice daily, with entire resolution.

CASE VIII.—Rose N., aged eighteen years, single. A tumor as large as a walnut, lobulated, at pectoral margin of left mamma, noticed eight months. Out-patient May 2, 1887; treatment until July 11th, then lost sight of. In December, 1893, states in reply to inquiry, that some enlargement persists, but that all inconvenience has ceased, and that she has never required any further treatment.

CASE IX.—Emma H., aged nineteen years, single. At the age of fourteen a tumor as large as an egg stated to have been removed from left breast; now scar three inches long at lower border. External to this, movable tumor size of hazelnut. Attendance from October 3 to November 14, 1889. Seen on January 8, 1894, when no trace was to be felt.

CASE X.—Fanny S., aged twenty-four years, single. Induration of parenchyma at outer part of left breast, noticed eighteen months. Treated from November 8, 1886, to February 14, 1887, with complete resolution.

CASE XI.—Marie W., aged twenty-eight years. At upper and outer part of left breast the tissue was hard and nodular, forming a flattened tumor one inch in diameter; noticed two months. A neurotic girl with the usual tight stays. Treated from January 2 till March 19, 1894, when only a faint trace of the induration remained. At first the lead iodide with two drachms of red mercuric oxide ointment; subsequently the former with fifteen grains of alcoholic extract of belladonna to the ounce.

The preceding would appear to have been examples of the true "fibroma of adolescence" occurring in young girls, with no obvious

cause other than tight stays and a neurotic habit. At a later period small indurated tumors, which cannot be regarded as due to arrested or perverted development and which commonly own an inflammatory origin, are met with. These similarly yield to local treatment.

CASE XII.—Jane H., aged forty-four years, married, no children. Out-patient August 26, 1876. In the left breast an irregularly nodulated, moderately hard induration of the parenchyma, noticed six years. Lancinating pain was described, but was referred also to the opposite breast, in which was another "lump" rather smaller. Although the age was so suspicious, a diagnosis of non-malignancy was founded on the duration of the case and the simultaneous affection of both mammæ. Under the inunction four times daily of ung. plumbi iodidi, the condition wholly vanished in about eight weeks. On November 8, 1887, the date of the last recorded attendance, no trace of tumor was perceptible.

CASE XIII.—Louisa P., aged thirty-four years, married, three children. Ill-defined indurated "lump" in left breast following blow three months previously. Inunction four times daily of ung. plumbi iodidi. Attendance from September 12 till December 19, 1879. Gradual resolution; on latter date nothing abnormal to be felt.

CASE XIV.—Emma H., aged thirty-six years, married, four children. Softish movable "lump" at upper part of left breast, noticed three months; in right breast another smaller. A history of cancer in the family. By October 17th both tumors had all but entirely disappeared.

CASE XV.—Eliza R., aged thirty-eight years, widow. A hard ill-defined tumor at upper part of right breast noticed two years. Treatment as usual from September 24, 1880, until January 7, 1881; then complete resolution, leaving no trace of abnormality.

CASE XVI.—Fanny S., married, one child two years of age. Blow from child seven months previously. Deep in left breast a tumor the size of a walnut, freely movable. Treatment from December 1, 1882, until March 2, 1883, then no trace perceptible.

CASE XVII.—Elizabeth B., aged thirty-seven years, married, no children. In left breast hard nodule, size of large pea, noticed two years. Treated with unguent. hydrarg. iodidi viridis, night and morning, from January 25 till February 15, 1884, with perfect resolution.

CASE XVIII.—Emily W., aged thirty-seven years, married, one child one year of age, not nursed. Tumor, size of walnut, noticed six months, movable, at upper part of left breast. Treatment as usual till February 23d, then nothing abnormal.

CASE XIX.—Mary D., aged twenty seven years, single. Out-patient November 19, 1888. Blow two months. Marked induration at outer part of left breast; great pain. On November 26th nothing to be felt.

CASE XX.—Emma B., aged thirty-four years, single. Seen June 17, 1889. In left breast a nodule size of hazelnut, flattened, not hard, movable, noticed four days. On June 24th no tumor discernible.

CASE XXI —Martha P., aged forty-six years, married, no children. On July 6, 1885, a tumor the size of a small orange, movable, elastic, at upper part of left breast. Duration one year. Attendance till July 20th, then tumor much smaller. Not seen again, but writes (December, 1893) to say she has had no more trouble.

CASE XXII.—Eliza B., aged thirty-seven years, married, two children, youngest eight years of age. Small lobulated tumor at lower edge

of left breast, noticed six weeks. Occasional lancinating pain for several years. Treated from September 12 till October 17, 1892. Complete disappearance of "lump."

CASE XXIII.—Mary L. P., aged thirty years, single. Blow eighteen months; pricking pain a fortnight. Tumor the size of large bean at upper part of right breast. Treated from November 6, 1893, till December 4th, then only a trace remained.

The following is a somewhat analogous instance of irritative hyperplasia in the youthful male breast.

CASE XXIV.—Mr. H., aged twenty-two years, sent for consultation in May, 1891, by Dr. McElfatrick, of Mere. Irregularly lobulated induration of left breast, forming a flattened tumor one inch in diameter, noticed two to three months, and apparently caused by slight blows when jumping up to a clerk's high desk. Treated for three weeks with the lead iodide ointment, then for five days with lin. belladonna; complete resolution.

A third class of "dispersible" tumors is afforded by inflammatory conditions in, or cystic dilatation of, lactiferous ducts. And in this may be included small sebaceous cysts of the areola.

CASE XXV.—Mrs. F., aged forty-eight years, no children; subject to eczema of the areola. Just below right nipple prominent, very hard red swelling, size of hazelnut, noticed nine days only; no fluctuation. In great consternation, as an operation had just been advised by distinguished gynecologist. Treatment from November 14, 1893, till December 2d. Liniment of iodine locally for a week, then the lead iodide ointment; complete resolution.

CASE XXVI.—Frances P., aged thirty-seven years, single. Outpatient December 15, 1882. Small soft tumor, size of large pea, one inch from left nipple. After a single week's treatment only faint trace discoverable; no further attendance.

CASE XXVII.—Jane P., aged twenty-seven years, married, no children. Above right nipple a pea-like nodule, evidently a dilated duct, of fifteen months' duration. Treatment from April 6, 1891, till April 20th, then nothing abnormal found.

CASE XXVIII.—Emma W., aged sixty-three years. Sebaceous cyst of areola, blackish in color, size of pea, of two and a half years' duration. Seen October 28, 1889. By November 11th entire resolution.

As already hinted, treatment such as that indicated, if adopted for a malignant tumor, will only waste the precious time available for curative eradication before secondary infection has ensued; and it is of no avail for the cystic benign growths which appear during the devolution of the female breast. A prompt and at the same time careful diagnosis is therefore essential. After the adolescent period (25 years) even simple fibromata yield far less readily than before development is complete; and the earlier after their appearance these are dealt with, the better.

# THE BACTERIOLOGY AND PATHOLOGY OF DIPHTHERIA.[1]

By Simon Flexner, M.D.,
ASSOCIATE IN PATHOLOGY, JOHNS HOPKINS UNIVERSITY; RESIDENT PATHOLOGIST TO THE JOHNS HOPKINS HOSPITAL.

The results of the researches of Loeffler, published at the close of the year 1883, may be said to mark the beginning of the new era in the study of diphtheria. With these researches closed the epoch which must be considered to have been inaugurated with the writings of Bretonneau, which represent the beginning of the scientific history of diphtheria, and to have ended with the cultivation and inoculation experiments of Klebs and his pupil Graham Brown, which led to the discovery although, indeed, not to the isolation of the specific micro-organisms of the disease. This period included the experimental researches of Hallier, Letzerich, Rosenbach, Wood and Formad, and others. The failure of Klebs to obtain in pure culture the bacillus diphtheriæ, which he accurately saw and described in the diphtheritic membrane, illustrates with what difficulties the bacteriologist had to contend before the introduction by Koch of the solid culture media.

Whatever doubts surrounded the first publication of Loeffler regarding the relation to diphtheria of the micro-organism which now bears his name, have now been finally dissipated. The isolation of the Loeffler bacillus, by workers in different parts of the world, from the local lesions of the disease in many thousands of cases would seem to afford irrefutable evidence of the constancy of the relationship existing between the bacillus and the pathological process. Hence it is that attention has been directed to a consideration of other aspects of the subject, that of the presence or absence of the Loeffler bacillus in primary diphtheria.

The wide divergence of opinions regarding diphtheria which existed prior to the discovery of the bacillus diphtheriæ illustrates with what difficulty every advance in the study of a disease is accompanied so long as its etiological factor is unknown. It had long been a well-established fact that by a variety of agents pseudo-membranes, which offered more or less the appearances seen in diphtheria, could be produced upon mucous surfaces in man and in animals, but it was at the same time recognized that none of these agents could reproduce the symptom-complex of diphtheria; and none of us is likely to forget the almost interminable discussion which arose as to whether it was primarily a local or a constitutional disease. Nor did the study of its pathology give much assistance in the solution of this question, and only after the

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specific micro-organisms had been obtained in pure culture did it become possible, by a study of its properties outside the body and of its occurrence under natural conditions in human beings, to establish a rational basis for a classification of the disease.

First of all, then, it is important to distinguish between the anatomical and the etiological significance of the term "diphtheria," and it will be found that a limitation of the term to a disease characterized by the presence of the bacillus diphtheriæ in the affected portions of the body will do much to eliminate the confusion of pathological conditions which, while anatomically resembling one another, are otherwise quite distinct.

I deem it unnecessary to bring before you at this time, in a systematic manner, the bacteriological evidence that the Loeffler bacillus is the sole cause of diphtheria; nor shall I occupy your time with a description of the biologic properties of the organism. The cultures which I pass around will show the manner of the growth of the bacillus upon various culture media, and under the microscope cover-slip preparations can be seen which will exhibit to you its characteristic morphology. I would, however, emphasize the fact that the properties of the Loeffler bacillus are sufficiently characteristic to permit of its recognition under the most diverse circumstances and stamp it as a distinct species.

The first question to which I would direct your attention regards the proportion of cases of pseudo-membranous inflammation of the throat which are due to the Loeffler bacillus. In the first series, reported by Loeffler himself, a certain number of the cases examined did not yield the diphtheritic bacillus; but of these several were recognized as not having been cases of primary diphtheria. This failure to find the Loeffler bacillus in all pseudo-membranous inflammations in the throat and air-passages has been confirmed by later investigators. Thus, in a table prepared by Escherich, in 679 examinations collected from Paris, Berlin, and New York, the bacillus diphtheriæ was found in 427, or in 62 per cent. of all the cases. In a series studied by Morse, of Boston, of 301 cases examined, in 217 was found the Loeffler bacillus—*i. e.*, it was present in 72 per cent. of the cases. Park and Beebe report that of 5611 cases examined, positive results were obtained in 3255 (58 per cent.). The bacillus was absent in 1540 cases (27 per cent.), while 816 cases were doubtful. The doubtful cases represent those in which for some reason or another satisfactory cultures were not supplied. If these, then, be disregarded altogether, although it may not be entirely fair to do this, we find that out of 4795 cases of suspected diphtheria, 68 per cent. were instances of true diphtheria.

It is acknowledged that the pseudo-membranous anginæ which are associated with the acute exanthemata are commonly not caused by the Loeffler bacillus, but are due, in most cases, to the invasion of the

streptococcus pyogenes. In a series of bacteriological examinations made by Booker in such cases, the bacillus diphtheriæ was constantly absent, and Escherich, who studied fourteen cases of scarlet fever, states that the Loeffler bacillus is never present in the early days of the disease, but that in several of these cases it was found to be present later on, a fact which he attributes to the imperfect separation of diphtheria and scarlet fever patients in the Munich Hospital, where his studies were carried out. He also found the Loeffler bacillus in certain cases of measles and whooping cough, and he agrees with other investigators in holding that the acute exanthematous diseases predispose to infection with the bacillus diphtheriæ.

It had been observed by the older clinicians that during epidemics of diphtheria pseudo-membranous inflammations of the throat, in the course of typhoid fever, were more frequent. Morse reports four cases of typhoid fever complicated with diphtheria, of which at least three developed diphtheria after admission to the hospital.

A purely local and perhaps non-contagious inflammation of the larynx has, by the bacteriological examination of a considerable number of cases of membranous croup, been shown to occur unassociated with diphtheria. These cases, however, are quite exceptional. Of 88 cases of membranous croup studied by Martin, 59, or 67 per cent., were of diphtheritic origin. The statistics of Park indicate that in New York fully 80 per cent. of the cases of the same disease are caused by the Loeffler bacillus. Of 229 of Park's cases, in 167 no membrane or exudate was found above the larynx. Welch and Abbott, Booker, Williams, Kalisko and Paltauf, Concietti and Fraenkel have reported cases of laryngeal diphtheria in which the pseudo-membrane was confined to the larynx and lower air-passages.

The rare and interesting case of ascending croup, in which the membrane begins in the deeper portions of the air passages and extends upward, have been little studied. From the lungs of one such case Martin cultivated the Loeffler bacillus in large numbers.

It is an undoubted fact that a case of so-called membranous laryngitis has not infrequently been the first of a series of cases of genuine faucial diphtheria.

Among the most important results of the bacteriological study of the inflammations of the throat and air-passages has been the discovery that cases which present the features of a mild catarrhal angina or of a lacunar tonsillitis may be associated with the presence of the bacillus diphtheriæ, and that from these can arise other cases in which membrane is found on the fauces. This class of cases has been studied by Escherich and Feer, and especially by Koplik. Within the past few weeks I have seen two such instances in the practice of Dr. W. D. Booker, and from them obtained the Loeffler bacilli in cultures. The first was a girl of

sixteen years, who came to the surgical dispensary of the Johns Hopkins Hospital for enlarged glands of the neck. Upon examination she was found to have a lacunar tonsillitis. She suffered no inconvenience other than that resulting from the swollen glands. The plugs from the crypts of the tonsils contained the Loeffler bacillus. She made a rapid recovery.

The second was a child one and a half years of age, whose tonsils were greatly swollen and almost meeting in the middle line of the throat. There was no visible membrane. Cultures from the throat showed the presence of the bacillus diphtheriæ. The local treatment recommended by Loeffler was used, and by the third day all symptoms of the disease had disappeared.

Heubner has just published a short series of cases, in which he calls attention to what he describes under the title of latent diphtheria. These were secondary to other diseases than scarlet fever and measles, and occurred in the young in the course of wasting affections, such as rickets, tuberculosis, etc., in hospital practice. The symptoms were fever, gastro-intestinal disturbances, and slight bronchial and nasal catarrh. Heubner says that diphtheritic infection is not apt to be suspected in these cases until laryngeal stenosis suddenly develops or the fact is revealed at autopsy by the finding of a false membrane in the pharynx or larynx.

Roux and Martin have found in the course of their inoculation experiments for the preparation of the antitoxin that animals which had been previously inoculated with other bacteria or their poisons, from which they had recovered, were more susceptible to the diphtheria toxin; and, similarly, that pregnant animals or such as had just given birth to young, exhibited a similar diminution of resistance.

The mucous membrane of the nose affords a favorite resting place for the Loeffler bacillus. In pharyngeal diphtheria these bacilli are commonly present in the nasal secretions, even in the absence of membrane in the nose. Primary diphtheria of the nasal mucous membrane sometimes occurs. First observed by Baginsky, additional instances have been reported by Abbott, Abel, Ravenel, Czemetschka, and Felsenthal. Townsend reports 5 and Park 10 cases of fibrinous rhinitis, in which the membrane was confined to the nose in 4 and 9 cases respectively. Katz has just recorded an instance of faucial diphtheria, the infection in which was traced to a case of diphtheritic fibrinous rhinitis. Similar results have attended the bacteriological examination of other investigators, and Escherich has seen one case in which the infection of the nasal mucous membrane took place through the tear duct in a case of diphtheritic conjunctivitis.

Babes first cultivated the Loeffler bacillus from the pseudo-membrane in diphtheritic conjunctivitis, and reproduced the disease by the inoculation of the organism upon the conjunctiva of rabbits. A number of

cases of pseudo-membranous conjunctivitis have since been found to be associated with the bacillus diphtheriæ, although it must be stated that not all are caused by this organism. In two cases which I examined for Dr. Hiram Woods the Loeffler bacillus was not found in the exudate, but streptococci were present in both. The results of Councilman's investigations would go to show that certain cases of otitis media are due to the bacillus diphtheriæ. He found this organism in the pus from the middle ear of a patient who had diphtheria, and in two cases in measles without diphtheria of the throat.

The skin surfaces of the body would appear to be immune to the action of the Loeffler bacillus in the absence of any loss of continuity. Thus Wright cultivated the diphtheria bacillus from excoriated or ulcerated surfaces of the skin in seven cases of diphtheria; and Park found this organism in wounds of the finger received by physicians while performing intubation. Cases of wound diphtheria associated with the Loeffler bacillus are reported by Neisser, Treitel, and Abel; but it is probable that most cases of so called wound diphtheria are caused by other micro-organisms. The relative insusceptibility of the external surfaces of the body to infection with the bacillus diphtheriæ is illustrated by the behavior of tracheotomy wounds, which only exceptionally become infected with this organism. Foltanek examined 953 tracheotomy wounds without succeeding in a single instance in isolating the Loeffler bacillus. Other observers have been more successful, but in these cases the possibility of the contamination of the wounded surfaces with the tracheal secretion cannot be excluded.

Having now passed in rapid review the situations of common localization of the Loeffler bacillus upon the surface and in the cavities of the body, I would ask your attention to its distribution within the viscera. At the time of Loeffler's first publication he expressed a belief that the bacillus diphtheriæ was to be found only at the local site of the disease, and that it did not invade the tissues at all, or at least only exceptionally. He had cultivated it, however, in one case from the lungs, and later Kolisko and Paltauf and Babes isolated in rare instances a few organisms from the internal organs. The observations of Frosch, since confirmed by others, have shown that not uncommonly a few bacilli enter the circulation and may be cultivated from the internal organs at autopsy. They are not, however, only small in number, but their distribution is irregular, and it is necessary to transplant considerable quantities of material in order to grow them. Frosch cultivated the bacillus from the blood of the heart, the brain, pleural and pericardial exudates, pneumonic areas in the lungs, spleen, kidneys, bronchial and cervical lymph glands, and liver. Booker has also obtained the organism from the internal organs. At the autopsy of a child of three years, which had both pharyngeal and laryngeal diphtheria, I obtained the bacilli

diphtheriæ in pure culture from the heart's blood, cervical lymph glands, liver, spleen, lungs, and kidneys; but, contrary to Frosch's experience, they were present, in this case, in large numbers in the blood, glands, and spleen. In this, as well as in a later instance, I was able to cultivate the Loeffler bacilli from broncho-pneumonic areas, and also to demonstrate them in sections from the bronchi and lung tissue. The predominating organism, however, was the micrococcus lanceolatus. Kutscher has just shown that the Loeffler bacillus exists at times in considerable numbers and may be the predominating organism in cases of broncho-pneumonia associated with diphtheria, and he inclines to the view that it is capable of causing both bronchitis and consolidation of the lung substance. Wright has found the bacillus diphtheriæ in the internal organs in cases of human diphtheria, and he has also cultivated them from the liver, spleen, heart's blood, and kidneys, in a small number of experimental guinea pigs. Abbott and Ghriskey found that after inoculating cultures of diphtheria bacilli into the testicle of guinea-pigs small nodules containing this organism sometimes appeared in the omentuum, and this bacillus has also been cultivated from the ecchymotic patches in the stomach and from the surface of the membrane in croupous gastritis. Of special interest is the case reported by Howard, in which a bacillus in all respects resembling the bacillus diphtheriæ, except that it did not possess pathogenic powers for guinea-pigs, was cultivated in large numbers from the heart valves in a case of acute ulcerative endocarditis, and from the infarctions in the spleen and kidneys.

Notwithstanding the results of later and more searching studies which have necessitated a modification of the earlier views regarding the relation of the Loeffler bacillus to diphtheria, and notwithstanding the fact that it is now known that the Loeffler bacillus can develop not only locally upon the affected mucous membrane, it must be considered as proven that only a few organisms penetrate into the body; and there are undoubted instances in which the disease has pursued a typical, severe, and even fatal course in which the bacilli have remained localized in the mucous membrane. Hence the local process is still to be regarded as the chief seat of the activity of the bacillus diphtheriæ.

The study of the properties of this bacillus as it exists outside the human body, and the results derived from the inoculation of susceptible animals, would indicate that the effects which it produces upon the body are due to a soluble poison, a toxin, proceeding from its growth and multiplication. By means of this toxin, separated from the living bacilli, all the constitutional effects of diphtheria can be induced. For the production of the false membrane the presence of the bacillus itself is necessary.

The growth and multiplication of the bacilli in the false membrane

in the pharynx, larynx, and nose are associated with the formation of this toxin, which entering the body causes the symptom-complex of the disease. Sidney Martin has extracted from the pseudo-membrane an albumose which possesses the poisonous properties of the toxin.

We owe especially to Roux and Yersin, and Brieger and Fraenkel, our knowledge of the nature and properties of this toxin. According to their researches, it belongs to a class of substances of albuminous nature, possessing poisonous properties, for which the name tox-albumins has been proposed. Up to the present time the tox-albumin of diphtheria has not been obtained in a pure form, but in its impure state it is found to possess extraordinary potency. Susceptible animals (rabbits, guinea-pigs, kittens) inoculated with it exhibit all the symptoms of diphtheria, not excepting the post-diphtheritic paralysis.

The study of the action of this bacillus upon animals has shown a material difference in the virulence exhibited by cultures derived from different colonies. The guinea-pig, being the animal most susceptible to its influence, is generally employed for testing these variations.

A small dose of a virulent culture introduced subcutaneously will kill a guinea-pig in from forty-eight to seventy two hours, and an equal quantity of a somewhat less powerful culture will cause death in from four to six days. The animals show at the seat of inoculation a local membrane which contains the bacilli and a more or less widely spreading œdema of the subcutaneous tissue. The bacilli can be recovered from the seat of inoculation. Weaker cultures may take one, two, or three weeks to bring about a fatal result, and there are still others which produce only a local reaction at the points of inoculation, from which the animal recovers. Different colonies of bacilli obtained from one case may exhibit these wide variations in virulence.

No less striking are the differences in the potency of the toxin produced by the bacillus, and it has been found that there exists a direct relation between the virulence of the organism and the intensity of the poison which it is capable of yielding.

It cannot be said that any such relation between the virulence of the organism and the severity of the symptoms has been shown to exist for human beings. Indeed, contrary to the results arrived at by Roux and Yersin, which seemed to indicate that a progressive diminution in the virulence of the bacilli corresponding with the mildness of the attack took place, and that the same thing happened during convalescence from a severe attack. Escherich, Tobiesen, and especially Wright, have shown that no such diminution of virulence occurs. Fully as virulent organisms may be found in cases which are mild from a clinical standpoint as in those of severer grade.

The questions of individual predisposition or of resistance to the invasion of the bacillus diphtheriæ and to the effects of its toxic products

have therefore to be considered in this as in the case of other infectious diseases. What the physical basis for this distinction really is we are probably still far from having discovered. A few of the conditions which favor or inhibit infection in human beings and in animals seem clear. Hence it is that the results of the recent studies of Wasserman and Abel upon the action of the blood-serum of healthy human beings upon animals previously inoculated with the Loeffler bacillus are suggestive, as they indicate that the serum of certain individuals contains some protecting substance, the power possessed by the serum of adults being greater than that of children.

It is quite established that the bacillus diphtheriæ may possess all grades of virulence down to complete absence of pathogenic power, and some confusion has arisen by the introduction of the term "pseudo-diphtheritic" bacillus to denominate an organism which, while it resembles the true bacillus diphtheriæ, is devoid of virulence for guinea-pigs. This bacillus was first isolated by Hoffmann, who regarded it as identical with Loeffler's bacillus. Roux and Yersin advanced the view that this so-called "pseudo-diphtheritic" bacillus represents an attenuated form of the true bacillus diphtheriæ, and the work of Abbott, Park, Koplik, and Escherich lend support to this position. On the other hand, it is suggested that the name "pseudo-diphtheritic" should be reserved to designate bacilli which, though resembling the true diphtheritic bacillus, show certain cultural differences and are devoid of pathogenic effect for guinea-pigs. Such a pseudo diphtheritic bacillus has been found in a few cases of genuine diphtheria associated with the true bacillus diphtheriæ.

It must be confessed that our knowledge of the relation of the Loeffler bacillus to diphtheria and associated pathological processes has been much extended in the past few years. Thus this organism has been found in a large proportion of all cases of pseudo-membranous inflammation of the throat, and is the probable causative agent in all cases of true diphtheria. Those pseudo-membranous anginæ in which the Loeffler bacillus is not found are characterized in themselves and distinguished from cases of true diphtheria by the mildness of their course, their slightly contagious character, and their low mortality; in Park's statistics, excluding those associated with scarlet fever, the death-rate was 1.7 per cent.

That virulent diphtheria bacilli may be present upon the mucous membrane of the pharynx without giving rise to false membrane is proved by those cases of pure laryngeal diphtheria from which the bacilli have been cultivated from the pharynx. Loeffler found in the throat of a healthy child a bacillus which was identical with the true bacillus diphtheriæ; later Hoffmann, Fraenkel, and Feer found it under similar circumstances. In 330 healthy persons examined by Park and

Beebe, who gave no history of contact with diphtheria, they found the non-virulent organisms in twenty-four, virulent bacilli in eight, and pseudo-diphtheritic bacilli in twenty-seven. The examination included for the most part children. Of the eight cases in which virulent bacilli were found, five were children in an asylum where from time to time true diphtheria occurred. Of the remaining three, one was from a house where a supposed case of croup had existed three weeks before. Two of the eight children developed diphtheria some days later; the other six remained healthy. Loeffler recently examined the throats of sixty school-children, and found diphtheria bacilli in four. Of these, two subsequently developed diphtheria, one a slight inflammation of the throat, the fourth remaining well.

The study by Park of the throats of persons exposed to diphtheria has shown that in 50 per cent. virulent Loeffler's bacilli are present. Of these, 40 per cent. developed later the lesions of the disease. Park states that in the families from which his statistics covering this point were obtained the conditions for the transmission of the disease were most favorable. On the other hand, in families where the patient suffering from diphtheria had been well isolated, the bacilli were found in less than 10 per cent. of the healthy children.

Considered in the light of our present knowledge of the common existence of pathogenic micro organisms, such as streptococci, staphylococci, and pneumococci, in the mouths of healthy persons, without necessarily doing harm there, these facts of the occasional occurrence of virulent diphtheria bacilli in the throats of healthy persons are less surprising. Doubtless it is necessary that a certain susceptibility to their action, a predisposition, if you prefer, must exist, before their peculiar effects can be exerted. I beg to recall in this place the experimental results obtained from healthy human blood-serum as bearing upon this point. However, the figures furnished by Park and Loeffler would indicate that the presence of the bacillus diphtheriæ in the throat is far more significant even for the individual himself, to leave out of consideration for a moment those with whom he may come in contact, than are the other pathogenic organisms mentioned.

The bacteriological study of convalescent cases shows that virulent bacilli may persist for a time after the disappearance of the false membrane. They are not uncommonly present after two to three weeks, and in a few instances they have been found after a much longer period. In a case reported by Park and one also by Abel they were still demonstrable on the fifty-sixth and sixty-fifth day respectively after the membrane had entirely gone.

The severity of the case has no influence upon the duration of the presence of the bacilli; the occurrence of nasal diphtheria as a complication seems to favor this persistence. Tezenas found in twelve cases

complicated with nasal diphtheria that for a long time after the membrane had disappeared a serous exudation from the nose continued. In ten of these cases Loeffler bacilli were demonstrable so long as the secretion persisted, although they had long ceased to be present in the throat. Hence, where cultures cannot be made it is recommended to continue the isolation of the patients for at least three weeks after the disappearance of the membrane.

It is probable that the bacillus diphtheriæ is capable of increasing only within the body of infected persons or in the seat of inoculation of susceptible animals. The bacilli are, however, able to remain alive and in a condition capable of causing infection for a considerable time when outside the body. Conditions which promote the drying of the organism and exposure to strong light are unfavorable for the preservation of its vitality. The individual Loeffler bacilli quickly die when allowed to become air-dry. But in bits of mucus or membrane, particularly if protected from the light and preserved in a damp place, they may remain alive for a long time—upon old cultures from five to fifteen months; in bits of membrane from four to seventeen weeks. They have been cultivated from tableware and toys; from soiled linen which had been in contact with the sick; from the shoes and hair of nurses, and from the broom used to sweep the floor of a diphtheria ward. In view of these facts it is unnecessary to point out the importance of thorough disinfection and of the rigorous care that should be observed in disposing of the excreta of the sick.

The so-called diphtheritic affections of domestic animals are, perhaps, not to be feared as a source of infection for human beings, as the same micro-organism is not concerned in their causation. It is, however, not excluded that domestic animals may carry the infection of true diphtheria from one place to another, without themselves exhibiting symptoms of the disease. At the present time it is not possible to make any positive statements regarding the diphtheria of cats.

The association of other micro-organisms with the bacillus diphtheriæ in the false membrane is by no means uncommon, although cases of pure diphtheritic pseudo-membranous inflammation are known to exist. The organisms usually associated with the Loeffler bacillus are the pyogenic cocci, strepto-, staphylo- and diplococci. Their presence is now known to be of great clinical and pathological significance, especially if they enter the deeper tissues as they are wont to do. While the bacillus diphtheriæ is found only exceptionally in the adjacent lymph-glands and internal organs, there exists a group of cases of poly-infection, especially with streptococci, in which the latter enter the circulation and invade the organs. Since the introduction of the antitoxin-treatment of diphtheria this class of cases has attracted especial attention.

These cases had been recognized and studied by a number of investi-

gators, and in this country especially by Councilman and his associates. Broncho-pneumonia, suppuration of lymph glands, and septic forms of diphtheria are attributed to these associated bacteria, particularly to the streptococcus. Roux and Yersin first pointed out the importance of this poly-infection, and subsequently Schreider, Mya, Barbier, and Martin confirmed their observations. Funk, Roux and Martin, and Bernheim have recently made careful experimental studies on this subject. The latter employed only organisms which had been associated in the diphtheritic membrane, and he found that the virulence of the Loeffler bacillus is increased both by being grown with the streptococcus and in the filtrate obtained from streptococcus cultures. A limited number of experiments with staphylococci did not show a similar increase in the virulence of the bacillus diphtheriæ, a result confirmatory of Mya's earlier experiments. On the other hand, in human beings, according to Morse's statistics, cases of poly-infection with staphylococci run a more unfavorable course than those with streptococci. Welch has criticised his conclusions and shown the improbability of their correctness.

I am admonished by the little time which remains to me to be brief, and all the more because the Association is to have from another source a paper on the antitoxin-treatment of diphtheria. The great central point toward which the previous work outlined in this paper all tends has been the discovery of a rational and successful therapy. The culmination seems near at hand.

The natural variation in virulence of the bacillus diphtheriæ led first unintentionally, and later purposely, to the rendering of animals immune to subsequent inoculation with the Loeffler bacillus. But it was soon observed that this method of securing immunity was capricious and unreliable. The use of cultures of bacilli attenuated by chemical agents, the injection of tissue fluids of an animal dead of a previous inoculation of the bacilli into another, the employment of sterilized bouillon cultures and of cultures grown in infusions of cellular organs, such as the thymus gland, while attended with success in some cases, were found to be precarious methods of securing immunity, and not at all adapted to large animals. The use of a virus obtained from bouillon cultures several weeks old by filtration has been successfully employed by Behring Ehrlich and Wassermann, Roux, and others, to render even large animals, such as the horse, immune to large doses of diptheria cultures. And one of the surprising and significant facts which have resulted from the study of the changes induced in the body fluids of the immune animal consists in the discovery that they contain a substance which is capable of rendering other animals and even human beings immune from diphtheria and also of curing the disease after its development.

This antitoxin obtained from the blood of immune animals, though antidotal to the poison of the bacillus diphtheriæ, exerts no power over the poison produced by the bacteria associated with the Loeffler bacillus in the pseudo-membrane, and thus it becomes clear why cases of poly-infection are less influenced by the antitoxin-treatment than those of pure diphtheria.

It is but a confirmation of an intuitive belief to find that in the blood of human beings well of diphtheria there exists a body similar to that found in immune animals. The experiments of Klemenciwicz and Escherich proved the correctness of this supposition, and Abel has just furnished a larger series of observations with confirmatory results. In animals a certain time elapses after the inoculation of the toxin before the antitoxin appears, and it is only after repeated doses at intervals that a high grade of antitoxic power is developed in the blood-serum. In human beings the blood taken on the fifth or sixth day after infection shows no protective action, the protective power appears from the eighth to the eleventh day, and it persists a variable time. Sometimes it fails to appear at all. After some months it may be still present, though in a diminished degree, or it may have entirely disappeared. The longest periods of persistence yet observed are one hundred and fifty and two hundred days.

These facts bear out the experience of physicians who have noted that diphtheria is not one of those diseases one attack of which affords protection from subsequent infection. Perhaps the individual differences observed are to be explained by the variation in the amount of healing and protecting substance formed in any case.

The time which I have consumed in dealing with the bacteriological aspects of my subject leave me little opportunity to treat of the pathology of diphtheria. I shall not weary you with a minute account of the pathological changes which are found in this disease. With the appearance of the pseudo-membrane you are all familiar, and I have already pointed out that in many atypical cases only a bacteriological study can decide the true nature of the case. In a case of genuine diphtheria the Loeffler bacilli are found in great numbers in the pseudo-membrane, there being less in the deeper than in the older and more superficial parts; they are also found on the adjacent mucous membrane. A lesion of the surface provides a condition favorable to their settlement and increase, a fact also borne out by experiments on susceptible animals. Where no previous defect exists it is probable that the toxin itself can cause a superficial lesion. The tonsils, which are the starting-points of many cases of diphtheria, afford an excellent nidus for the bacilli on account of the incompleteness of their epithelial covering even in health. The depth and extent of the necrosis of the mucous membrane vary in different cases, and the character of the pseudo-

membrane is affected by the nature of the underlying structures; in the pharynx it is firmer and less easily separable than in the larynx and trachea, where a distinct basement membrane is found in the mucosa.

The earlier workers in the field of experimental diphtheria failed to find in the internal organs the lesions which had been described by Oertel in the tissues in human beings dead of diphtheria. These lesions consist of foci of cell death characterized by extensive destruction and fragmentation of cell nuclei. In such areas of necrosis fibrin may be deposited. Dr. Welch and I confirmed and extended these results of Oertel by experiments upon guinea-pigs, kittens, and rabbits. Subcutaneous inoculation of the cultures of the organism or of the filtrate of a bouillon culture four or five weeks old produces, besides the local lesions peculiar to each, foci of cell death in the adjacent lymph glands and in the lymph glands throughout the body, in the spleen, liver, lungs, heart, muscle, and intestinal mucosa. The kidneys show degenerative changes. When the dose is small and the animal lives several weeks the paralysis which belongs to the disease may develop. This phenomenon, first observed in animals by Roux and Yersin, was noticed among our animals. Interesting changes have been described in the peripheral nerves under these conditions by Sidney Martin. In some cases he observed defects in the myeline sheaths, which stained poorly in osmic acid, while in certain severe cases the sheaths had entirely disappeared. The axis-cylinders were either intact or had undergone granular degeneration and the continuity of some of the fibres had become broken. At times the muscles supplied by these nerves showed signs of fatty degeneration. These changes agree with those found by Gombault Meyer, Leyden, and Arnheim in human beings who had suffered from diphtheritic paralysis.

According to Johannessen,[1] post-diphtheritic paralysis develops in human beings in cases which have pursued a mild course apparently, as well as in those of severer grade. The percentage, however, is higher in epidemics which have been of a severe character; the figures given by Unterholzner being 4 and 17 per cent. respectively. G. Hoppe-Seyler found that paralysis developed in 27 per cent. of cured cases. Mendel has called attention to the common absence of the knee-reflex after diphtheria, which may not return for five to six months, and of great interest are those instances in which five to six weeks after the disease paralysis of the diaphragm intervenes in which a mortality of 50 per cent. has been observed.

Albuminuria is a not infrequent complication of the disease. Thom-

[1] For the statistics of the frequency of the affection of various organs in human diphtheria I am indebted to the recent paper by Seitz entitled Die Fortschritte unserer Kenntnisse über Ursache, Wesen u. Bekämpfung der Diptherie in letzten Decennium. Münchener med. Wochenschrift, 1894, Nos. 50 and 52.

sen states that it occurred in 21 per cent. of his cases; and Baginsky and Jansen, in both of whose cases the bacteriological diagnosis was made, found it in 46 per cent. of theirs. The figures given by others are: G. Hoppe-Seyler, 61 per cent.; Cadet and Gassicourt, 75 per cent.; Ranke, 85 per cent.; and Unruh, 100 per cent. Hagenbach states that of all cases which come to autopsy 34.6 per cent. show kidney lesions; and Schrakamp found nephritis in 40 per cent., and Cropf in 46.2 per cent. of such cases. In twenty-four cases in which the bacteriological diagnosis had been made, Felsenthal and Bernhard found at autopsy that the cortex of the kidneys was increased, and that the epithelium of the tubules was swollen, vacuolated, necrotic, and disintegrating. The morphological constituents of the urine vary with the symptoms, and, depending upon these, hyaline, epithelial, and fatty-granular casts may be present. In severe cases the urine may be much diminished in amount; but uremia is unusual, and hydrops, which seldom occurs, is, when present, of a mild grade.

The heart is not uncommonly involved. The affection is, however, usually not of its serous coats, although pericarditis and endocarditis are known to occur. But it is the muscular structure which suffers, and perhaps the nervous mechanism as well. The figures indicating the percentage of cases in which the heart is affected in the course of diphtheria vary from 10 per cent. to 38 per cent. (G. Hoppe Seyler). The histological changes are described as being either of the parenchymatous variety, in severe grades associated with fatty degeneration, or as consisting of an interstitial myocarditis.

The lymphatic glands of the neck, which usually become swollen, show only a slight tendency to suppuration; according to Henoch, suppuration occurs in 2 per cent. of the cases. The spleen is commonly enough somewhat enlarged, but it is only exceptionally found to reach a considerable size. Various complications may develop in the course of the disease, the most frequent being pneumonia; but this is due in the great majority of instances, as doubtless are also the joint affections which occur, to the invasion of secondary micro-organisms.

In conclusion, I have in this paper attempted to show, although necessarily in an incomplete and fragmentary manner, that in the last decade, by the employment of modern methods of research, more light has been thrown upon diphtheria than had been gained in the half century which had elapsed since its description by Bretonneau, and I think that I may safely say that there is no other infectious disease which has been rendered so clear in its etiology and pathology, so amenable to prophylaxis, and in the treatment of which so much is now promised.

# RELATION OF INFECTIOUS PROCESSES TO DISEASES OF THE NERVOUS SYSTEM. PATHOLOGY AND ETIOLOGY.

By James Jackson Putnam, M.D.,
PROFESSOR OF DISEASES OF THE NERVOUS SYSTEM, HARVARD MEDICAL SCHOOL.

The subject with which we are concerned[1] may be studied from either of two points of view: that of the bacteriologist, whose interest is rather with the nature and mode of action of the infective agent, or that of the neurologist, whose training has made him more familiar with the laws of reaction of the nervous system. It is with the latter aspects of the subject that this paper will mainly deal. Where bacteriological doctrines and discoveries are utilized I shall try to confine myself within conservative opinions, an intention for which no apology is needed.

The problem before us is the following:

1. To inquire into the pathogenesis of the nervous affections which are obviously of infectious origin.

2. To investigate the claims of the affections which are only suspected to be of infectious origin.

3. To investigate the contributive causes which make certain parts of the nervous system peculiarly liable to suffer from infectious influences.

It is not only and not so much the direct effects of infection which are most to be feared. The prostrating influence of the original struggle, though it may end in the apparent defeat of the infective agent, is liable to search the hidden weaknesses of the nervous system and to lay it at the mercy of morbid agencies with which it would otherwise have been able to cope successfully.

The patients with affections of the nervous system who have come under observation in the Out-Patient Department for Diseases of the Nervous System of the Massachusetts General Hospital, during the last five years, aggregate a little over five thousand; and of these, about five hundred had had, within a year before the onset of the illness for which they presented themselves, some infectious disease which might be suspected to have been at least a partial cause. About 80 per cent. of these affections were post-influenzal and post-syphilitic (even excluding the cases of paretic dementia and ataxic tabes with a syphilitic history, which numbered respectively 29 and 71); the rest, in order of frequency, were cases preceded by diphtheria (53), typhoid (47), scarlatina (14), malaria (13), measles (9), gonorrhœa (8).

[1] This paper was read in abstract at the meeting of the Congress of American Physicians and Surgeons, June, 1894, but a number of changes and additions have been made since then. It is intended rather as a summary of the work of others than as a report of original research.

It is pre-eminently the duty of the neurologist, in analyzing a given case, or a series of cases such as this, to consider, first of all, to what extent the results could be explained without referring them to the direct action of the infective agent.

To do this fairly would require an intimate acquaintance with many influences, of which the following are the chief:

I. The nervous system has certain natural proclivities to certain forms of disease in the production of which the infectious process only joins hands with developmental or inherited tendencies, or accentuates the habitual strains of life [laws of "devolution" (Jackson); laws of "degeneration;" disproportion between waste and repair (Edinger)]. Our knowledge of these tendencies is still far from complete.

It is not only the typical psychoses and neuroses which can arise in this way. There are indications that some of the acute and chronic degenerative affections, such as symmetrical polyneuritis, with its striking peculiarities of distribution, and the different forms of tabes, may be shown to mark some of the natural lines of fracture or cleavage exhibited by the nervous system when subjected to strain.

It must not, however, be forgotten that these factors seem to be called out more strongly by certain infectious processes than by others, and made to operate in more or less definite ways, so that, clinically, the connection between the infection and the final disease, though indirect, may be a tolerably close and systematic one.

II. The infectious processes may give rise to secondary disorders of nutrition, of cardiac, vascular, digestive, sclerotic, and metabolic origin, and a primary infection is liable to become complicated at any part of its course by a secondary infection with its own train of consequences.

It should also be remembered that under all circumstances poisonous substances are being formed in the body and are constantly eliminated by the kidneys, the bowels, the lungs, and the skin, and when this elimination is checked or arrested, as often happens in the course of infectious processes, an auto-intoxication takes place which bears its share in the production of symptoms [Bouchard(16)].

When we find ourselves in face with the problem just how we should explain the clinical and anatomical effects of infection, such researches as these should make us cautious. Bouchard, at the end of a series of researches as to the nature of the cholera infection, comes to the conclusion that there are two classes of influences at work: first, the poison primarily produced by the specific organism, whatever that may be; second, a secondary poisoning due to uræmia (itself a complex and variable cause), and that each of them have their own symptoms, which may succeed or alternate with each other. How rarely, in dealing with the clinical results of infectious disease, do we take these secondary pro-

cesses into account. [See Joaquin de la Pezuela; *El Progresio Medico*, April, 1894.]

So far as we now know, the principal effects produced by the infective agents acting on the human nervous system are the following:

*A.* A series of *primary disorders* is induced, not directly due to gross lesions, but to the toxic action of one or more of the *soluble elements* of the (often complex) poison.

In this class of primary toxic affections belong the symptom-complexes of tetanus, rabies, and whooping-cough, a portion of the cerebral, spinal, and meningeal symptoms of acute infectious diseases, and perhaps many of the characteristic symptoms of diphtheria, Landry's paralysis and chorea. It is not presumptively impossible or even improbable that even (temporary) symptoms of peripheral-nerve disorders may be due to poisoning without recognizable lesions. Lesions may, indeed, be generally found, but it is by no means to be assumed that they were the cause of the symptoms noted as typical.

It will seem less remarkable that this infiltration of toxic substances should occur, even to the extent of causing the death of the nerve elements, without giving rise to demonstrable lesions, if we consider the case of ether. This is well known to be a nerve poison, and if injected into the tissues in the neighborhood of a nerve, degeneration will follow. On the other hand, when an exposed frog's nerve is kept moistened at one point with ether, its power of conduction may be inhibited for at least forty minutes at a time (Bowditch), and yet on the removal of the ether the nerve may resume its functions as if uninjured.

It has been made pretty certain that the signs that we think of as characteristic in the nervous affections following infectious processes are due far more to the toxic substances which are developed in the course of bacterial action than to the micro-organisms themselves.[1] This is a principle, the importance of which is being more and more clearly shown as time goes on. The formation of tubercle and abscess and the exudation of purulent meningitis imply the presence of micro-organisms, and bacteria are found now and then in the brain, spinal cord, and nerves, under various circumstances, without its being possible to say as yet what their relation is to the lesions accompanying them.

It is only in the case of lepra that the bacteria may be said actually to invade the nerve cell or nerve fibre (Babes(9) and others), and even here the occurrence is not constant (Kuhne, Zambaco-Pacha). Ordinarily, the bacteria lie in the lymph spaces. The presence of histological cell-changes after infection does not necessarily imply the direct action of bacteria, for they may occur in a typical form where only sterilized

[1] *Vide* editorial, Therapeutic Gazette, 1894, p. 185; also, Flexner [Toxalbumins, etc.], Medical News, August 4, 1894.

and filtered cultures have been used, as has been shown by Welch(93) for the case of diphtheria. [See, also, Flexner, loc. cit.]

*B.* The *peripheral nerves* suffer from disorders of nutrition due to

1. Infiltration with toxic substances;
2. Interstitial and vascular disorders;
3. Diseases of their trophic centres.

As compared with neuritis due to mineral poisons, the infectious neuritis is perhaps more frequently due to the second of these causes (Cramer), but the distinction is not absolute.

*C.* The *cerebral*, and to a less extent the *spinal membranes* become breeding-places for colonies of bacteria. Possibly, meningitis is occasionally due to the irritation of soluble toxines, as in some cases of scarlet fever [Bendel]. (*Wiener med. Presse*, 1894, No. 23.)

*D. Focal* (generally hemorrhagic) non-suppurative *lesions of the brain, cord*, or *nerves* may be set up by either bacteria or their toxic products. It must be admitted that as yet we know but little of this important matter except through experiments with animals, though acute lesions of this sort are met with which are supposed to be of infectious origin. Bacteria of many kinds have, to be sure, been found in the central nervous system, though rarely, in man, as the obvious cause of focal inflammation, with the important exception of abscess and tubercle. Characteristic bacteria are also claimed by Pfuhl to have been found in the foci of encephalitis following influenza. Fortunately, we now know that specific toxines are capable of exciting focal lesions, and we are prepared to listen with respect to the clinical evidence indicating a direct causal connection between the soluble poisons of influenza, diphtheria, variola, scarlatina, typhoid, gonorrhœa (Leyden, Hayden and Parmentier, Dufour), and the focal myelitis which sometimes follows them.

Enriquez and Hallion (Soc. de Biologie, April 14, 1894) have also found that the toxines of diphtheria injected under the skin of dogs may cause, *if the dose is not too large*, intense congestion of the gray matter of the cord, with hemorrhages, and foci of inflammation, characterized by formative irritation of the neuroglia and destruction of nerve elements. Symptoms suggesting a similar process were also seen in an ape. Animals are, perhaps, more subject than man to *toxine myelitis*. At any rate, localized destructions of the gray matter of the cord have been found by Gilbert and Leon (*Semaine méd.*, 1892, p. 65), and more recently by Thoinot and Masselin (*Rev. de méd.*, June, 1894) after inoculation with virulent cultures of the bacillus coli communis; by Bourges (Soc. de Biologie, 1893) after injections of erysipelas cultures (streptococcus pyogenes?); and by Vincent (*Arch. de méd. expérimentale*, 1893), after inoculation with typhoid bacillus. Roger, also (*Ann. de l'Institut Pasteur*, 1892), has produced a poliomyelitis by inoculation

of rabbits with a streptococcus obtained from erysipelas, and his observations are particularly interesting from the fact that this result only attended a certain phase of virulence of the organism, which he was not able to reproduce at will.

It is probable that acute myelitis in man is sometimes of infectious origin. The occurrence is rare, but we are not called on to reject the evidence on this account. The possibility of secondary infection should, of course, never be lost sight of. Auché (*Semaine méd.*, Nov. 1894, Soc. de Biologie) found a secondary streptococcus infection to be the probable cause of a myelitis following variola.

*E.* Diffuse lesions of nutrition of nerve-cells and tracts are being found more widely in proportion as our means of investigation improve, as witness the changes in the posterior columns observed by Bikeles in diphtheria. It is quite possible, however, that many of these are due to œdema or disorders of circulation (see Edinger, *Sammlung klinischer Vortrage*, No. 106).

The most careful research into the character of the earliest lesion in cases where hitherto lesions have been supposed not to be found are those described by Golgi(41) as occurring in *rabies*. The nerve cell shows impairment of its nutrition by peculiar changes affecting the size and contents of the nucleus. The cell-protoplasm, the endothelium of the vessels, and the neuroglia take part in the change, which is one first of irritation, then of reaction and repair. Golgi(41) denotes the whole process an "encephalo-myelitis parenchymatosa." The irritative stage is associated with active hyperæmia. He distinctly asserts that the histological peculiarities, taken by themselves, are not pathognomonic. They only mark where the poison has struck, and perhaps indicate the severity of the blow. It is especially noteworthy that most of these changes, as observed in rabbits, were found before the stage of complete paralysis had been reached, and similar lesions were in fact noted in the cerebellar cortex within four or five days after inoculation and before any symptoms had appeared. One is reminded by this statement of the peculiar form of parenchymatous neuritis observed by Gombault in guinea-pigs, as a result of chronic lead-poisoning, at a period when the animals appeared to be perfectly healthy. Golgi further notes that the changes which he found in rabies are very similar to those which he had discovered in chorea, in spite of the wide etiological and clinical difference between the two affections.

It may be noted as a bit of caution that minute changes such as Golgi describes are only to be accepted as pathological when made by trained observers and under the most favorable conditions of preparation. Even then it might not always be easy to say that we were not dealing with the effects of fatigue or of œdema, and still more difficult to distinguish between the action of specific toxines and that of the toxic

products of disordered nutrition. A good deal has been made of vacuolation of the nerve cell as pointing to some toxic influence, and Campbell(20) has devoted an interesting paper to this subject. Vacuolation has, however, been noted under such varying conditions that one may be allowed to wait for a more general consensus of opinion as to whether it indicates anything more than one of the ways in which nerve cells regularly degenerate. It certainly affords no means of distinguishing between bacterial poisons and others [Afanassijew, Campbell].[1]

More important than the histological changes described by Golgi is the distribution of the lesions which he noted. There would have been no special reason to suspect that the brain and cerebellum as well as the medulla and spinal cord would be involved in rabies, and the fact that this is found to be so, assuming that the observation is correct, is an additional reason for thinking that many poisons which seem to be very limited in their action, judging by the symptoms which they excite, are really universal nerve poisons, and will excite widespread lesions if time enough is given them.

When we pass beyond these minute parenchymatous lesions, the change which seems most characteristic is vascular congestion with infiltration of leucocytes, often associated with hemorrhage, and perhaps due to endothelial changes, at least in part. This tendency has been so often discussed with relation to infectious processes in other parts of the body that it need not detain us here further than as suggesting that the œdema so produced may in itself be a cause of some of the associated nerve lesions. It might, for example, cause degeneration of nerve fibres, by pressure or disturbance of circulation, and might perhaps cause such destruction of nerve cells as is seen in poliomyelitis. In general, when the hemorrhage and exudation are of infectious or toxic origin there is probably at the same time an actual infiltration of poison into the nerve elements and the other tissues in the immediate neighborhood of the affected vessels; but whether this infiltration precedes the congestion, or is a necessary factor in its production and localization, is unknown. Flexner [*Med. News*, August 4, 1894] makes an interesting contribution to the study of these focal lesions as affecting the liver and kidneys and other organs.

The next question to be considered, and one which is especially important to the neurologist, is with regard to the influences which increase the liability of the nervous system to suffer from the infectious processes—the contributive causes of disease.

The question is really divisible into two parts, which need to be carefully distinguished. The first concerns the influences which lessen the power of resistance of the body as a whole to invasion by the organisms

[1] Afanassijew: Acuter u. chron. Alcoholismus, Beiträge zür Path. Anat. u. Allgem. Pathol., 1890, p. 443.

of disease, the second concerns only the influences which increase the vulnerability of the nervous system, or lessen its power of resistance, in respect to the poisons produced by the organisms after the invasion has taken place.

The distinction is an important one. A healthy person, with intact mucous membranes and vigorous nervous centres [see Bouchard, Chorrin, Gamaleia, Buchner, Gley], might resist the onset of infection, while even a healthy nervous system might not be able to withstand the action of a specific virus. Indeed, it is open to question whether the specific poisons do not affect healthy nervous centres more strongly, sometimes, than enfeebled nervous centres. For the response to the action of a poison, as in the case of tetanus, for example, though it takes the form of a symptom of disease, is often in reality a sort of reaction which sometimes implies a certain degree of previous vigor. It is obvious that a difference would also be likely to exist between the character and degree of the functional response to acute intoxication, and the liability on the part of the nervous system to suffer local lesions of nutrition, which experiment has shown to attend toxine poisoning as well as the direct action of bacteria.

It will probably be found that strong nervous centres are as liable as weak ones to exhibit the *toxic symptoms* of acute infectious poisoning, while feeble nerves and nerve-centres are more prone to show *disorders of nutrition* under the added strain which the presence of the poison brings to bear, especially if this is reinforced by impaired circulation or œdema.

A few of the questions touched upon in the foregoing summary may profitably be considered a little further from the standpoint of the practical physician.

Among the post-infection disorders of the nervous system there is none so common as *neuritis*, involving usually many nerves in a symmetrical manner, but sometimes single nerves. There can be but little doubt that the infectious toxines are capable of causing neuritis, but it is also probable that we habitually include under this name a number of affections which might properly be separated. Such are: 1, the neuritis attending the first stage of an infectious process before there has been time for the development of general disorders of nutrition; 2, the post-infectious neuritis, in the production of which general disorders of nutrition and a variety of other causes play an important part; 3, the acute, usually fatal and hemorrhagic, neuritis of unknown origin.

Finally, it should not be forgotten that what we have considered as neuritis is often associated with nuclear and diffuse spinal lesions, and that better methods of investigation may show these to play a more important part in the production of the symptoms and nerve lesions than has hitherto been supposed.

Paralysis of the peripheral type may be unattended by demonstrable

lesions, and this fact has lent support to the view that the spreading forms of paralysis to which the name of Landry is attached may belong in the same category with polyneuritis.

According to the view of those who believe in this relationship, and among them are such careful and intelligent observers as Ross[1] and Leyden,[2] there is no marked difference in clinical history between selected cases of spreading neuritis of the ascending type and the affection to which the name of Landry is attached, and the mere absence of demonstrable lesions does not, they think, justify us in setting apart the latter cases as belonging to a special group.

On the other hand, there are not wanting thoughtful and conservative pathologists, among whom Hun[3] may be mentioned, as having given the subject a careful revision, who hold that so long as there does appear to be a class of cases where the disease is generally fatal, and yet no definite lesions are found, there is nothing gained by lumping them, for the sake of pathological unity, with demonstrable cases of neuritis.

Both of these arguments have their value, and it is a gain to be able to recognize this fact, even though a positive conclusion is beyond our reach.

It is important to strive after pathological unity, and to learn to recognize the bond between conditions which are ostensibly unlike. It is equally important to realize that the reasoning which tempts us to substitute theory for observation is a dangerous weapon.

It seems to me that this much can be safely said: That the mere absence of demonstrable lesions in a given case of poisoning cannot be taken as proof that the pathogenesis of the symptoms is not the same as in another case where lesions were found. That which is characteristic is often the primary action of the poison rather than the effects of the lesions, even when lesions are present.

The history of tetanus and diphtheria, and perhaps rabies, gives warrant for this assertion. For in some instances of these diseases few or no lesions are discoverable, while in others the lesions are more extensive than the symptoms would have suggested. Goldscheider (*Berl. klin. Wochenschr.*, June 4, 1894, p. 546) takes the position that the presence or absence of demonstrable lesions in Landry's paralysis is a matter of slight importance. Jolly (*Ibid.*) takes the position assumed by Hun.

Part of the symptoms of acute hemorrhagic [infectious?] neuritis are unquestionably of peripheral origin—those, namely, which are due to the pressure of the endoneural exudation. It is, however, far from certain whether death, in these cases, is due to the neuritis or to a poisoning of the nerve centres.

[1] A Treatise on Peripheral Neuritis, 1893.
[2] Zeitschr. für klin. Med , vol. xxiv.
[3] New York Medical Journal, May 30, 1891.

Leyden, as well as various other observers, has called attention to the fact that in some of these cases changes in the spinal cord are discoverable, one of the commonest of which is swelling of axis-cylinders.

This was very noticeable in a case studied by myself, where death occurred at the end of a week, from respiratory paralysis. (*New York Journal of Nervous and Mental Diseases*, 1887.) Edinger [*l. c.*] thinks that this swelling of axis-cylinders is often referable to œdema, but it is probable that it at least implies an impairment of resistive power of morbid origin.

As regards the more chronic forms of neuritis which follow known infection, there can be but little doubt that they are toxic in origin; but it is for most of them quite uncertain whether the poison is identical with that which caused the primary infection, or is due to secondary disorders of metabolism. It has been suggested that the stimulants given during the illness may be a contributive cause [Starr].

The peripheral nerves (or their trophic centres) are singularly sensitive to poisons of many kinds. Ross enumerates forty causes of neuritis, and a few more could be added to the list.

Among those recently noted are puerperal conditions [Moebius(62), Bassette (11); see also *Nouvelles Arch. d'Obstet. et de Gynécol.*, 1894, No. 9], erysipelas [Grasset, Lew], septicæmia [Lloyd and Riesman(59)], pyelonephritis [Dana], suppuration of the pleura [Fiessenger(35)], gonorrhœa [Engel-Reimers (*Jahrbücher der Hamburger Staatskranken Anstallen*, 1890)].

It is true that the lesion is not precisely the same in all these cases. In the form which follows acute infectious diseases the morbid process may centre around the bloodvessels, and is said to be, in general, rather interstitial than parenchymatous [Cramer(22)]. The spinal cord is apt to be involved with the nerves in these cases. In some instances the parenchymatous degeneration may be due to the pressure of œdema. In the acute (hemorrhagic) form, which is supposed to be of primary infectious origin, the trunks of the nerves and the nerve-roots may be involved, as well as the peripheral portion. Different varieties of degenerative neuritis are also described, such as the "peri-axillary" and "segmental" forms.[1] It may be that careful research will show that where an irritant organic poison is circulating in the blood, capable of causing neuritis, the endothelium of the vessels will show changes like those described by Golgi as occurring in rabies.

The *cerebro-spinal membranes* afford a remarkably favorable breeding-place for many kinds of bacteria. The symptoms are probably due partly to the exudation itself, partly to the irritation of the sensitive membrane, partly to the absorption of toxic products. The organism

[1] This whole subject has been recently worked up by Cramer(22), with great thoroughness.

which plays the largest part in the production of both the epidemic cerebro-spinal meningitis—the sporadic forms not associated with suppuration elsewhere, and the meningitis which sometimes accompanies pneumonia, is the so-called pneumococcus, or micrococcus lanceolatus. The history of this important bacillus has already a voluminous literature, but interesting analyses are given in the papers by Netter(63), Welch(93), Foà,[1] and in the report of the admirable research by Flexner and Barker(37) into the nature and causes of the recent epidemic of cerebro-spinal meningitis at George's Creek Valley, Md. This [pneumococcus] form of meningitis seems to be by far the most common variety even of those occurring independently of epidemics of pneumonia. Out of thirty such cases Netter found sixteen to be due to this organism, while the largest number induced by any other single organism was six. Out of forty-five cases of primary meningitis reported by other observers and collected by Netter, thirty were instances of pneumococcus infection.[2]

Flexner and Barker do not find it probable that in epidemics of cerebro-spinal meningitis the micrococcus invades the body principally by the air-passages. They think it more probable that it passes into the digestive tract and thence, by way of the blood, to the brain. It is interesting to note, in this connection, that the injection of cultures does not excite meningitis in animals, unless made directly into the cerebral cavity.

The high importance of both simple and purulent, and especially obstructive inflammations of the antrum, nasal sinuses, and ethmoid cells for the introduction of both this organism and others to the cerebral membranes, has of late been commented on by many writers (Beck, Macewen, Dmochowski(29), Neumann and Schaeffer(64), Allport(4).

I cannot leave even this hasty reference to the bacteriological origin of meningitis without calling attention to Macewen's masterly work on the *Pyogenic Diseases of the Brain*, in which a searching anatomical and clinical analysis is given of the mode of invasion of the organisms, the formation of abscess, and the origin and spreading of thrombosis and meningitis.

Not only are purulent meningitis and cerebral abscess excited by infection from the ear and naso-pharynx, through the introduction of the organisms already mentioned, but also meningitis is occasionally due to the bacillus of typhoid. (Tictine, Adenot, Drews.)

It is possible that the poison of scarlet fever and measles may occa-

[1] Zeitschr. für Hygiène, 1888.

[2] In a sporadic case of this sort, which I saw in consultation with Dr. Edward Forster, the whole illness lasted but five days, by the end of which time the corneas were opaque and the conjunctivæ purulent. The bacteriological examination was made by Dr. Wright, of the Harvard Medical School.

sionally be the direct cause of meningitis [see Bendel, *loc. cit.*]; but our knowledge of this subject is meagre.

Reference was made in an earlier part of the paper to *acute, primary, hemorrhagic encephalitis* as occasionally following various forms of the acute infectious disorders, and also as occurring without known infection, though perhaps not independently of a toxic cause. It is not necessary to discuss the matter further except to record a possible source of error in the diagnosis and even in the pathological examination. In a collection of cases of post-influenzal diseases reported by myself(75), one was included which, at the time the examination was made, I believed to be an example of this disease, but subsequent examination showed that nothing more than œdema could be made out with certainty. The case was one of considerable interest because the symptoms were so marked and so serious. An additional case is reported by Koenigsdorf (*Berlin. klin. Wochens.*, 1892, No. 9).

The subject of the relation of the *chronic spinal scleroses* to infectious processes is full of interest to both the physician and the pathologist. No doubt can be entertained as to the bare existence of the practical relationship. Everyone knows how frequently locomotor ataxia and lateral and mixed scleroses follow syphilis, though often at a period when the signs of the primary infection have long since ceased to show themselves. The relation of disseminated sclerosis to several infectious processes, and especially to malaria, is almost equally evident. I have, myself, seen a very convincing case of the latter sort.

What is the nature of this connection? We do not know, but I think it clears the way, in a measure, to note again the natural proclivity of the nervous system to become diseased in these ways. If we do this, we shall be more inclined to be catholic in admitting other causes besides the specific virus. The case of syphilis in its relation to locomotor ataxia and other spinal scleroses is a case in point. It contradicts all that we know of the action of syphilis, and the usual seat of its lesions, to assume that it is the direct cause of these degenerative scleroses, and it is delusive to try to help put this opinion by assuming an attenuated virus, or by calling to witness the rare instances of improvement under potash and mercury.

It is certainly true that gummatous inflammation sometimes gives rise to many of the symptoms of locomotor ataxia, and that this may be cured; and it is true, also, that various modes of treatment may help ataxics for a time. But the relation of syphilis to locomotor ataxia, though I think unquestionable as a clinical fact, is not to be explained satisfactorily, except on the assumption that some new, and perhaps toxic, influence is brought into play. Perhaps this influence would not be effective were it not that the nervous system is prone to suffer from the disease.

Sclerosis of the posterior columns occurs as a sign of structural weakness in Friedreich's disease;[1] it follows ergot, pellagra, and lathyrus poisoning; it occurs as a part of the degenerative process in chronic paralytic dementia; as a consequence of morphine-poisoning in dogs [Alt(5)]; and its outbreak is precipitated, to say the least, by such processes as influenza and trauma.[2]

Most important of all, posterior sclerosis is sometimes associated with progressive pernicious anæmia, and perhaps with other affections which, like that—to speak of what is probable though not proved—originate in auto-intoxication, due, perhaps, to morbid changes in the digestive tract.

The first communication on this subject was by Lichtheim, in 1887 (*Sixth Congress für innere Med. zu Wiesbaden; Verhandlungen*, p. 84); but, in 1893, Dr. W. Minnich published a careful monograph on the subject, and gave full reports of all the cases observed up to that time. Previously to this, and before I had seen Lichtheim's communication, I had observed a series of cases, one, or perhaps two, of which were certainly cases of pernicious anæmia, and in 1891 I published a paper under the title "A Group of Cases of Sclerosis of the Spinal Cord Associated with Diffuse Collateral Degeneration, Occurring in Enfeebled Persons past Middle Life, and especially in Women." (*New York Journal of Nervous and Mental Diseases*, February, 1891.)

The clinical reports were meagre, but the cases were of much interest. Various partial causes were noted, and among them lead-poisoning and chronic diarrhœa, a cause of degenerative affections to which attention has of late been called anew.

It is true that Minnich declines to admit that his cases are of the same order with locomotor ataxia, or even with the sclerosis of ergot (Tuezec; Grünfeld, *Arch. für Psych. u. Nervenkrankheiten*, vol. xxi. p. 618); but he is unable to explain them on a different basis except that they seemed to originate in foci of disease related to the vessels, and he admits them to be probably toxic in character.

His interesting paper also contains an account of another form of

[1] What is true of posterior sclerosis is true, also, of the other spinal scleroses and degenerations and the mixed forms, among which latter Friedreich's disease belongs. (See a paper and discussion by Strümpell and others. Wiener klin. Woch., 1894, No. 4, p. 69. Mendel here remarks that even multiple sclerosis may rest on an hereditary basis.)

[2] See a paper by Morton Prince, read at the meeting of the Neurological Association, 1894, and Klemperer, Zeitschr. für klin. Med., xvii., 1890. The interesting observations and ingenious theory by Obersteiner and Redlich (Institut für das Studium des Nervensystems, etc., zu Wien, Heft 2) can by no means be considered as closing the discussion as to the pathogenesis of tabes.

The argument that the posterior roots are squeezed at their entrance into the cord by a thickening of the membranes, of syphilitic origin, fails, as the authors recognize, to account for many other associated lesions of tabes, and fails, too, to recognize the rapid increase in symptoms which attends influences of general depressive character, such as influenza and trauma.

change in the posterior columns which seems to occur in some cases of pernicious anæmia, probably toward the end of life, and to be due to œdema. The rest of the cord is affected to some extent.[1]

Lichtheim refers to other conditions besides those which I have mentioned, which contribute to disease of these tracts, and among the rest suggests the stream of sensory excitations which the tracts are called upon constantly to conduct.

Edinger has recently worked out an elaborate theory which certainly, in part, is applicable here, according to which the failure of repair to keep pace with waste accounts for some of the diseases which we have been considering. (*Sammlung klinische Vorträge*, No. 106.)

It is true that just as there are differences between the different forms of neuritis, so, also, the posterior sclerosis which follows syphilis is probably not identical with that due to the other causes mentioned. The ergot-sclerosis, for example, is not so malignantly progressive, and is, perhaps, anatomically different; and there are other peculiarities of the different varieties, some of which are pointed out by Raymond(78) and by Friedheim(38). All that I wish to maintain is that there is a strong bond of resemblance connecting them all. There is even some evidence, apart from the important case of Friedreich's disease, that tabes may be a member of the so-called neuropathic family. We have all seen cases which suggested this tendency. Raymond says that it is especially prominent where the tabes develops in the later years of life.

It would not be worth while to attempt here even a cursory survey of the typical *syphilitic* lesions of the nervous system, the subject is so vast and has been so much discussed.

As regards the less common lesions of syphilis, I will refer to two forms which seem to me of decided importance.

One of these is a form of myelitis closely resembling the ordinary transverse dorsal myelitis, but differing from it in some respects, and apparently dependent upon syphilitic infection. The disease is of slow development, and the spastic element is strongly marked, in proportion to the paralysis and the loss of sensibility, which are relatively slight. The patients may improve, especially under the influence of an energetic specific treatment, while, at the same time, neither the symptoms nor the improvement point to typical gummatous disease. This form was first described by Erb, in the *Neurologische Centralblatt*, No. 6, 1892, under the heading of "Syphilitic Spinal Paralysis." Since then communications confirming Erb's view have been published by Kowalewsky (*Neurologisches Centralblatt*, 1893, No. 12) and by Kuh (*Deutsche Zeitschrift für Nervenheilkunde*, 1893, iii. 6).

[1] Quite recently Bikeles has observed similar degenerations of the posterior columns after diphtheria. [Arbeiten aus dem Institut für das Studium des Nervensystems, etc. Zu Wien Heft 2.]

The second form of syphilitic disease of which I wish to speak is that where more or less typical lesions of syphilis are associated with those of tabes. This is a very important connection, because cases of this sort are perhaps those where the symptoms of tabes yield, in some measure, to anti-syphilitic treatment.

Dinkler (*Deutsche Zeitschrift für Nervenheilkunde*, 1893, iii. 4 and 5) reports a striking case of this kind, and gives references to the earlier literature. [See, also, Sachs (*New York Med. Journ.*, January 6, 1894).]

As regards *diphtheria*, the conflicting nature of the views respecting the character of the nerve lesions is well brought out by a comparison of the comparatively recent descriptions by Gowers, Arnheim, Hochhaus, and Cramer. Gowers and Arnheim describe the neuritis as parenchymatous, while Hochhaus and Cramer think that in diphtheria (as in the other infectious processes) the primary change is vascular and interstitial, and Hochhaus refers many of the symptoms to pressure of œdema. Gowers quotes an interesting observation by Boissarie (*Gaz. Hebd.*, 1881, Nos. 20 and 21), describing a series of cases occurring in Paris, of paralysis of the palate, eyes, limbs, heart, "perfectly like that which occurs after diphtheria, and accompanied by albuminuria. The remarkable fact is that in these cases of primary palsy there was no history of preceding sore-throat, and in several of the cases distinct diphtheria followed the paralysis, which lessened during the throat affection. Some of these cases of primary palsy seem to arise by infection." At the same time there occurred a series of cases of severe diphtheria. In the light of recent bacteriological research it may be assumed with confidence that careful examination of the throat would have shown that the bacteria were really present, even where no soreness of the throat had occurred.

The experimental study of the nerve lesions of *diphtheria*[1] has given conflicting results. Good observers have repeatedly failed to discover histological changes to account for paralyses experimentally induced, and although changes have been found in man, especially in the peripheral nerves, yet they have been occasionally missed [even by recent observers; see Bikeles' paper in *Obersteiner's Arbeiten*, Heft 2, 1894], and perhaps represent only a terminal stage in the process.

Quite recently an experimental research by Stscherbak(86) has given more positive results. The changes which he observed can be divided for convenience' sake into two sets: those involving the peripheral nerves, consisting in well-marked degeneration, which on the whole corresponded in position and intensity to the paralytic symptoms, and those involving the spinal cord, membranes, nerve-roots, and the muscles. The former he regards as constant; the latter rather as incidental than typical.

[1] For an excellent account of the pathological anatomy of diphtheritic paralysis see Gowers' Diseases of the Nervous System, second edition.

*B. The diseases of the nervous system which are suspected, but not proved, to be of infectious origin*, are, especially, beri-beri, poliomyelitis, Landry's disease, certain forms of myositis, neuritis, myelitis, some of the cerebral palsies of children, chorea, disseminated sclerosis and other cerebro-spinal and spinal scleroses, amputation neuritis, herpes zoster.

The grounds on which a disease may be suspected to be of infectious origin are, when bacteria are found in the tissues; when the outbreaks occur in epidemics or are related to seasons or locality; when vascular and histological changes characteristic of the infection are found; or specific toxicity of the blood and urine; or if the disease has become much less frequent since the introduction of antiseptics.

On this latter ground the intractable *neuritis following amputation* has been suspected to be of infectious origin [Page(70)]. It is true that even when great care is taken to prevent infection amputation neuritis still occasionally occurs, but it should be remembered that at the best surgical asepsis can be but relatively perfect.

As regards the lesions to which the nervous system is liable as the result of infectious disease, there are some which are more or less characteristic in view of its structure and liabilities, and others which it shares with other organs and tissues of the body. Of the latter class are the vascular lesions, hemorrhage and exudation, which are of vasomotor origin or due to changes in the vascular walls such as are liable to occur in any part of the body. Where well-marked evidences of these vascular lesions occur it is common to consider them not only as evidence of infection, but also as the cause, rather than the consequence, of the parenchymatous lesions with which they are associated. This argument has been used of late with confidence and ability by Goldscheider(40) in support of the theory of the infectious, or at least the toxic, origin of acute hemorrhagic neuritis or myelo-neuritis and encephalitis, as well as of *poliomyelitis*.

It is certain that in this latter disease the signs of congestion and leucocyte infiltration are prominent, and a case published by myself in the *Journal of Nervous and Mental Diseases*, 1883, not included in Goldscheider's(40) or Siemerling's(85) lists, fully supports this view. In the report of this case it is expressly noted that the wasting of the ganglion cells was not by groups, but "depended on their position with regard to the centre of inflammation" (p. 19), and that "the process is not one which affects ganglion cells materially more than other tissues in their neighborhood." It was also suggested (p. 24) "that the original morbid change was one affecting the vessels and the circulation." At the time this paper was written much less was known than now about infectious processes. Death had occurred at the end of two months, and the lesions were, therefore, comparatively recent.

Another argument in favor of the toxic theory of poliomyelitis is that

this disease is certainly related to the acute (often hemorrhagic) polyneuritis, and that for this disease we find the same evidence of toxic origin, but in a still more marked degree.

In both affections we see the strong vascular element in the onset; in both the occasional relation to acute infectious disease, and with neuritis the relation to beri-beri.

As regards the analogy between poliomyelitis and neuritis, several instances of the combined occurrence of the two diseases have been published [Gowers(43)]; and the writer's experience bears out these views. In the case of central myelitis above alluded to as observed by myself, the clinical evidences of severe and widespread peripheral neuritis were unequivocal.

It is not impossible that we group, clinically, under the name of poliomyelitis, several affections which might in strictness be separated; or, in other words, that several different poisons are liable to affect the anterior horns of the spinal cord, exciting results which, though in the main alike, may differ in detail.

The experimental evidence is in favor of this view, and it is strengthened by the varying characters of the so-called epidemics of poliomyelitis, of which a number are on record. Perhaps the most remarkable of them is one which occurred in and near Rutland, Vt., during this past summer, and has been studied by Dr. C. S. Caverly (*Medical Record*, Dec. 1, 1894), and by Dr. Andrew Macphail, of Montreal (*Medical News*, Dec. 8 and 22, 1894). The number of cases studied was 126, and the symptoms of some of them were so peculiar that, although the diagnosis of "poliomyelitis" was considered as the most probable one, it was not regarded as perfectly satisfactory.

I can also place on record one more apparent epidemic of poliomyelitis (though a small one, considering the area concerned, and perhaps for that reason unimportant) which was observed in Boston during last autumn (*Boston Medical and Surgical Journal*, 1893, ii.). References to other instances of the kind are there given.

Since the publication of Goldscheider's communication on the nature of poliomyelitis other confirmatory observations on the same subject have been published. [Siemerling(85).]

Although, however, the idea is generally accepted that there is a toxic cause for poliomyelitis, no one has strongly affirmed that this disease is of bacterial origin.

As regards the infectious origin of *Landry's paralysis*, all we can say is that it occasionally follows recognized infectious diseases, and that its abrupt onset and rapid course, often at least unattended by gross lesions, point definitely to some toxic cause. There is no reason at present for calling this cause bacterial.

The theory of the infectious nature of *chorea* is interesting, but still

far from being proved. The subject is well presented in papers by Pianese(73)[1], of Naples; Dana(24), of New York; Berkley, of Baltimore (*Johns Hopkins Reports*, 1891), and a number of authors cited by them.

Pianese's investigation dates back to 1891. The only point which needs to be mentioned here is that he found in the cervical portion of the spinal cord, the medulla oblongata, and the cerebellum—but not, it would seem, in the brain proper—a bacillus which he considers as specific and which he was able to cultivate and use for experimentation. Injections of pure cultures into animals gave rise to motor symptoms and often death, but did not cause anything that could be called chorea, so far as can be judged from the abstract at my disposal. In the animals experimented with the bacillus was found again in various parts of the nervous system including the brain. Pianese has also examined the blood in a number of cases of ordinary chorea, and in one of them succeeded in finding this bacillus.[2]

Dana's(24) first article was published in *Brain* in 1890, and contained a report of accurate investigations into the pathological anatomy of chorea. His examination confirmed and defined those of previous observers, among whom Hanford (*Brain*, 1889–90, p. 129) may be specially mentioned. It seems clear that the most obvious change consists in vascular congestion, dilatation, sometimes leading to thrombosis or capillary hemorrhage, and that widespread degeneration of the nerve elements may also occur, besides subacute meningitis. In Dana's(26) second paper, besides changes of these sorts (though in this case the signs of vascular congestion were less marked), a small number of micro-organisms resembling the diplococcus lanceolatus were found, by H. T. Brooks, in the deeper layers of the pia mater and the superficial part of the cortex. The case was not one of typical chorea, however, and the number of micro-organisms was too few to warrant their being considered other than incidental.

Dr. Berkley's elaborate investigation showed a series of minute changes, of which the chief involved the membranes and vessels. Areas of focal inflammation were found in various parts of the brain, medulla, and pons, and among other conditions which are important as indicating the infectious character of the disease, there was a peculiar endarteritis, which, as Berkley says, is rare in persons of twenty-seven, except from an infectious cause. Micro-organisms were not found, but deposits of detritus were observed which resembled the remains of bacteria. In the second part of his paper, which describes the case of a choreic dog,

[1] Original paper not accessible; abstract of some length by Eulenburg.

[2] Dr. Mark Richardson, of Boston, has made careful bacteriological examinations of the blood of two choreic patients at the Massachusetts General Hospital, at my request, with negative result. Further experiments will be made.

Berkley compares, in adjacent columns, the changes which he found with those given by Babes(8) as characteristic of diphtheria, in order to show the analogy between the two processes.

If ordinary chorea turns out to be of infectious origin, it will be almost necessary to suppose that the bacillus which causes it is present in a harmless and inactive state in large numbers of persons, for the disease may develop almost instantly, or, indeed, instantly, in consequence of fright.

It is true that some sort of predisposition must, however, be present, for, fright or not, the disease is one which occurs far more easily at certain seasons of the year than others.

As regards the value of Berkley's anatomical argument, it would be, I presume, impossible to say whether the lesions pointed to a toxic agent due to bacterial action or to a toxic agent induced by some form of disordered metabolism, or due to retained excretions.

With regard to the other affections mentioned as possibly of infectious origin, there is but little to say. The argument in favor of this view is mainly that they are apt to follow other general diseases admitted to be infectious, like the acute exanthemata, but the exact significance of that argument is uncertain. One or two recent observations suggesting a relation between malaria and disseminated sclerosis have been published (Marie,[1] Torti and Angelini), and I have myself seen a striking example of the sort. A man in middle life and of good health was attacked suddenly with characteristic and progressive intention-tremor and scanning speech immediately after a sharp malarial attack. Under treatment by arsenic there was a slight improvement, but for the most part the symptoms persisted.

The argument with regard to *herpes zoster* consists essentially in its tendency to occur in epidemics—though it must be admitted that this tendency is by no means strongly marked—and in a somewhat marked liability to follow other acute infectious diseases. [See Weigert(92), Schäffer(81), Kaposi(51), Wasielewski(90).]

The infectious theory of *epilepsy* is as yet hardly in a form to call for critical examination. The argument that the attacks are temporarily arrested by some intercurrent infectious malady, which might be supposed to furnish antitoxines, to the blood, could, one would think, scarcely be seriously advanced by any one familiar with the history and therapeutics of epilepsy [see Féré(33), Marie(60), Quériand(76), Séglas(84), Lannois(55)].

The origin of *beri-beri* is still a matter of doubt, and I will refer to it only for the sake of calling attention to some recent observations,[2] which suggest that it is a protozoal disease, analogous to malaria.

[1] Mal. de la Moelle.

[2] Scheube, Glogner: Virch. Arch., vol. cxxxii. p. 50.

Glogner calls attention to the periodicity of the outbreaks of the symptoms, and claims to have found changes in the blood and an organism resembling the plasmodium.

Another means by which it is thought that the infectious character of some of these nervous diseases of doubtful origin may be tested is through the chemical and physiological study of the blood and urine. Albu has made this a subject of a special paper, and many other observations bearing more or less directly on this subject have been published. (Séglas, Fisichella, Ewald, Bouchard, D'Abundo(27), Régis and Chevalier-Lavanol(79), Voison and Peron(89); see also editorial with references, in the *Boston Medical and Surgical Journal*, September 14, 1893, and *Archives de Neurologie*, 1893, p. 240.)

These researches have not as yet borne much practical fruit. It is evident that before much can be done in the study of morbid urine the toxiology of normal urine must be thoroughly understood, and for this reason the recent publications of Bouchard are of decided value, though the conclusion which he reaches will doubtless require modification. Bouchard maintains that if men are not poisoned by the products of their own tissue-metamorphosis, it is simply because the poisons which are constantly being formed are as constantly carried off from the blood in the urine, which is toxic to a measurable degree.

He finds seven toxic substances in normal urine, each of which has properties of its own. The first is diuretic in its action, and consists practically of urea. This is only toxic in a considerable dose, and is in general prophylactic in its tendency, since by increasing the quantity of urine it helps to carry off the other substances.

The second ingredient is narcotic in character, and its chemical nature is not known, except that it is soluble in alcohol. The third is also soluble in alcohol and has the peculiarity of causing salivation. The other substances are characterized by their power of causing convulsions, contraction of the pupil, reduction of heat. One of the convulsive agents is potash. In uræmia all these poisons are relatively increased in quantity, and anything which interferes with elimination by the kidneys is liable to bring about this result to a greater or less degree.

## Summary.

It is important to separate (*a*) the symptoms and lesions which we can assert to be directly due to the specific toxines of the various infectious diseases, from (*b*) the effects of anæmia, œdema, intoxication from disordered metabolism, on the one hand, and on the other hand from (*c*) the affections which spring into existence because the nervous system was prone to them, either from peculiarities of structure, anatomical surroundings, circulation, and the like; or because other causes had been

at work to which the infective poison only contributed new effectiveness for evil.

In the first class (*a*) we can fairly place the symptom-groups of tetanus and rabies; and with reasonable probability the chill, pains, paræsthesias, acute delirium, disorders of micturition, and other symptoms which characterize the outbreak of many acute febrile disorders, though it must be admitted that we know little or nothing positive about their pathogenesis.

The focal hemorrhagic encephalitis and myelitis occasionally observed after influenza and other infectious processes is probably due to the action of the specific poison on the tissues and the vessels. Acute poliomyelitis and acute hemorrhagic neuritis may be of the same origin, though these opinions need further substantiation.

As regards tetanus and rabies, it is not probable that the anatomical lesions which have been found after death (Golgi and others) are actually the anatomical substratum of the characteristic symptoms. They may have been simply of correlative origin.

Post-infection meningitis is generally of purulent character, and implies the presence of micro-organisms; but the non-purulent form bears a relation to infectious disease which is in need of further study.

The paralyses of diphtheria are probably attributable to the direct action of the poison, but, as in the case of tetanus and rabies, it is by no means certain that the lesions sometimes found (though often missed) are the true cause of the symptoms. It is more probable that the first and characteristic effect of the poison is to excite a chemical or molecular change, and that this alone is strictly characteristic. Sometimes the paralysis passes away too rapidly to be attributed to neuritis. The lesions, when present, may be many and various, and the neuritis, which is the commonest form, is of varying types.[1]

The lesions met with in meningitis, and in a certain sense those characteristic of tuberculosis and syphilis, are directly due to bacterial action.

In the following cases the influence of cause *a* is more or less combined with those of causes *b* and *c*.

The question as to the origin of the post-infectious multiple neuritis is one of great interest. The most obvious position to take is in favor of its direct dependence on the infective poison; but, in view of the general fact of the intolerance of the peripheral nerves to poisons of all sorts, it is fair to suspect that the post-infectious neuritis may sometimes be due to toxic substances developed from impaired metabolism and sometimes to anæmia and œdema [Class *b*].

It appears to be occasionally possible to induce neuritis by experimental inoculation with diphtheritic cultures, and the form and sequence

[1] See, among others, Paul Meyer's paper in Virchow's Archiv, 1881, vol. lxxxv. p. 181.

under which the diphtheritic paralyses clinically occur suggest the action of a specific poison. If, however, the forms under which neuritis typically occurs are considered, it becomes obvious that natural proclivities of the nervous system are at least contributive causes.

The variety of conditions under which the spinal scleroses—both disseminated and system scleroses—occur suggests predisposing tendencies of one or another kind, common to all and acting in addition to the various special causes. The recent observations of Obersteiner[1] and Redlich, that the narrowing of the posterior nerve-roots at their point of penetration through the pia matter suggests a mode by which slight pressure [as from syphilitic meningitis] could set up the ascending degeneration characteristic of tabes, do not afford a complete explanation of that disease. This theory leaves unnoticed the close analogy between the syphilitic tabes of the lateral columns and that of the posterior columns. The occurrence of the peripheral neuritis met with in connection with syphilitic tabes, but rarely seen at other stages of syphilis, points to the presence of some poison as yet undiscovered, and strengthens the probability that the posterior-column degeneration of anæmia and ergot-poisoning, as well as that of syphilis, is mainly of toxic origin.

The complex nature of the infective poisons is shown by the varying relation between the toxic symptoms of the first stage (fever, delirium, pain, etc.) and those of the later stages.

In influenza the fever may be of trifling amount and duration, and yet the post-infectious diseases severe and lasting; in cerebro-spinal meningitis the fever is often slight. Again, it has been found possible, experimentally, to neutralize to a certain extent the fever-producing element in bacterial poisons by special antitoxines. [V. Centanni and Bruschettini, *Deutsch. med. Wochenschr.*, 1894, No. 12, p. 270.]

Finally, it is probable that a routine examination, by the best modern methods, of the central and peripheral nervous system, after infection, would show changes to be present far oftener than is now supposed. The studies of Golgi in rabies lend support to this view.

As an additional contributive cause of lesions, fatigue may be mentioned, since the experiments of Hodge(50) show that this is capable of exciting manifest changes in the nerve cells. It is a question for further investigation whether or not fatigue acts more forcibly on nerve centres poisoned by the products of infectious processes.

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## CASE OF A LARGE UNILOCULAR BLOOD-CYST DEVELOPING IN THE WALL OF THE UTERUS AFTER THE MENOPAUSE.

By J. C. Webster, M.D., F.R.C.P. Ed.,
ASSISTANT TO THE PROFESSOR OF MIDWIFERY IN THE UNIVERSITY OF EDINBURGH.

*Clinical notes.* Mrs. H., housewife, aged fifty-three years, was admitted to Ward 24, Royal Infirmary, on August 11, 1893, complaining of a swelling in the abdomen. It was first noticed by her in February, 1893. About six months before that time she was seized, one day, with a sudden pain in the pelvis after lifting a heavy tub. A week later, when washing, there was a return of the pain. It gradually passed away, and was not noticed again until March, 1894, a month after the abdominal swelling was first recognized. The pain was then so severe that she had to go to bed. It was felt throughout the pelvis, and was of a bearing-down nature; it was worse on the left side, and extended into the thigh. After this period the tumor increased rapidly, and there were recurrent attacks of pain. She lost flesh and became gradually weaker. She was a good deal troubled with frequency of micturition and constipation.

The menstruation began at the age of thirteen. It had always been of the twenty-fourth or twenty-sixth-day type. Each period lasted for three or four days, the quantity being abundant, but not excessive. Before marriage she suffered from dysmenorrhœa, but not afterward. She had never been troubled with leucorrhœa. Three years before her admission she passed the menopause. It had given her little distress. In its commencement there was some menorrhagia.

She had been pregnant seven times, first in 1859, and last in 1872. She had miscarried in 1877. The labors were easy with the exception of the fifth, which was tedious. She nursed all her children except the

fifth; she suffered from pelvic trouble for some weeks after the birth of this one.

On admission the patient was thin and emaciated, the face being sallow and having an anxious expression. The complexion was sallow. The abdomen showed well-marked striæ and a linea nigra. It was enlarged to the size of a seven-months' pregnancy. On palpation a thin-walled cystic swelling was found. Fluctuation was easily obtained in it.

On bimanual examination, the vagina was found to be roomy, the cervix lying low and looking downward and forward. The body of the uterus was retroverted, somewhat enlarged, and softer than normal. Above it was felt the cyst, which could be moved without displacing the uterus.

*Operation.* Laparotomy was performed on August 18th by Professor Simpson. The cyst was found to be growing from the fundus of the uterus. It was removed along with the body of the uterus and the appendages. Several adhesions were found on the anterior wall. The patient made a complete recovery and was dismissed on September 16th.

FIG. 1.

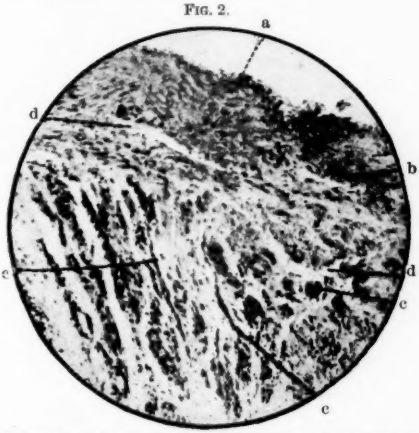
View of the cyst and its pedicle.

*Naked eye appearance of the cyst.* The cyst-wall was deeply congested, contrasting markedly with the pale uterus; it was attached by a pedicle one and a half inches in thickness. It measured eight inches vertically and seven and a half inches transversely. (These measurements were got after the emptying of the cyst.) The upper and anterior surface was roughened by peritonitis. The pedicle was continuous with the anterior part of the fundus. The uterus was somewhat enlarged; this was due chiefly to the elongation of the fundus.

The cyst contained several pints of dark fluid whose specific gravity was 1018. It was composed of blood, granular débris, flakes of fibrin, and a few cholesterin crystals. The inner wall was smooth in some parts, roughened in others. Here and there layers of fibrin were attached to it. On cutting into the wall several blood-collections of considerable size were seen. In the pedicle several of these were massed together. In the uterine cavity a very small polypus was found attached to the wall at the upper left angle.

*Microscopic appearance.* The outer surface of the cyst was covered with peritoneum altered in various parts by inflammatory changes. The cyst-wall varied in thickness in different places. That part close to the pedicle was the thickest, measuring about a quarter of an inch. At the opposite end of the tumor the wall was much thinner, measuring one-thirty-second to one-sixteenth of an inch. It varied in structure. Near the fundus it was made up of fibrous aud muscular tissue, the former being greatly in excess of the latter. To a large extent the connective tissue was dense and sclerosed. In some places it was in a condition of marked subacute inflammation.

FIG. 2.




Section through portion of cyst wall close to inner surface.

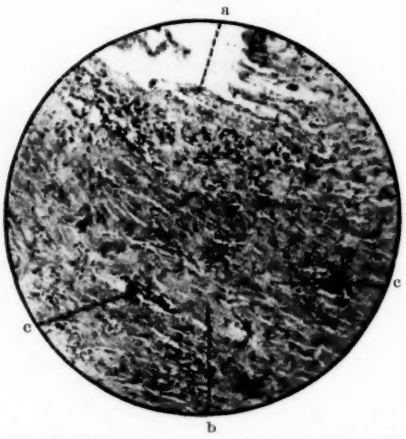
a. Inner surface. b. Dense fibrous tissue. c. Muscular bundles surrounded and compressed by dense fibrous tissues.

The muscle-bundles were separate from one another and were compressed by the sclerosed tissue; some of them were infiltrated with leucocytes. Most of the muscle fibres were in various stages of atrophy. In some cases the distinction between the fibres could not be made out. In certain parts the muscle nuclei appeared to be dividing.

In other parts of the cyst-wall the muscle-bundles were not so altered, being only separated from one another by masses of loose cellular tissue, which had a mucoid appearance in several places. In one or two sections only did one find muscle and connective tissue arranged as in the normal uterine wall. For the most part the muscle-bundles lay parallel with the sac-wall. In the thinnest parts, scarcely any muscle was found at all.

The inner part of the wall for the most part consisted of dense connective tissue varying considerably in thickness. In parts, however,

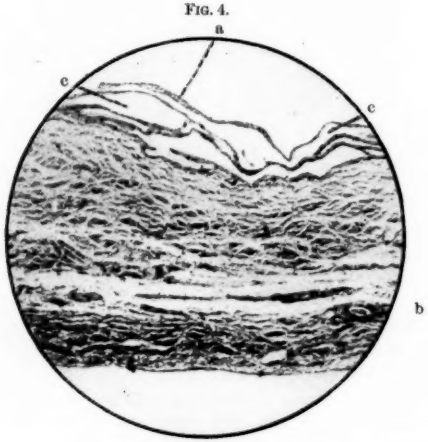
FIG. 3.




Section through portion of cyst-wall close to inner surface.

a. Inner surface. b. Dense sclerosed fibrous tissue. c. Compressed and degenerating muscle-bundles.

FIG. 4.




Section through cyst-wall.

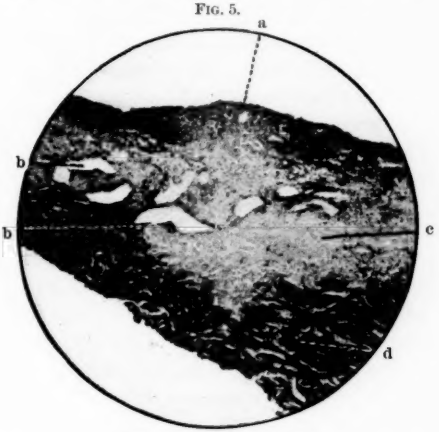
a. Inner surface. b. Outer surface. c. Blood-spaces in inner part of wall.

there was no condensation. Here and there blood-fibrin was attached to the inner surface, in many places masses of blood corpuscles were attached to it. Throughout the wall were found many dilated capillaries

filled with blood. In some parts close to the inner surface very large blood-spaces were found, only some of which were lined by epithelium.

The pedicle of the cyst was formed by an elongation of the fundus. On section it showed the same changes that were found in the neighboring part of the cyst-wall, *i. e.*, great increase of the connective tissue, atrophy and degeneration of the muscular bundles, subacute and chronic inflammation. In this pedicle, close to the cyst, was found a collection of cavities filled with blood, forming a mass about the size of a small walnut; it seemed to consist of dilated capillaries. An endothelial lining could be made out in several places, though in many parts it was wanting. Here and there throughout the pedicle, as well as in the wall of the large cyst, were found hyaline masses, in some cases ring-

FIG. 5.




Section through cyst-wall.

a. Inner wall. b. Blood-spaces. c. Sclerosed tissue. d. Ordinary fibrous and muscular tissue.

shaped or irregularly convoluted. These were probably obliterated vessels. The hyaline substance was of connective tissue origin. In it a few irregularly shaped compressed corpuscles were seen. This hyaline change was found also around the blood-spaces in the pedicle.

No sign of myoma was seen anywhere in the uterine wall or in the cyst wall, with the exception of the very small polypus, the size of a pea, projecting into the uterine cavity. The uterine mucosa showed marked interstitial inflammation, the glands and lining epithelium being absent.

REMARKS.—It is difficult with accuracy to establish the seat of origin and nature of this cyst. Did it arise from the degeneration of a fibromyoma, or was it simply a formation in the wall of the uterus apart from tumor growth? Were the contents, primarily, blood, lymph, or myxomatous tissue?

In regard to the first of these questions, I may say that I am of the opinion that the cyst did not arise in a fibroid tumor. In cases of large

tumors of the uterus hitherto described, *e. g.*, those of Sir Spencer Wells,[1] Fehling and Leopold,[2] Rein,[3] and others, there is no doubt as to the myomatous origin of the cystic growth; accompanying these there were fibroid growths in the cyst wall or in the uterine wall. The cyst was in these cases merely a degenerated tumor. Early cystic changes in fibroids have been noted by several observers.

In my case, apart from the small pea-like polypus projecting into the uterine cavity, there was not the slightest indication of myomatous formation. Neither did the cyst-wall nor the pedicle resemble a fibroid in structure. Yet this absence does not disprove the possible myomatous origin of the cyst. There may have been but a single fibroid in the uterus in which cystic degeneration might have occurred. If this be so, then the whole fibroid had disappeared and the cyst-wall represented the expanded and altered capsule of the tumor. There is, however, not the slightest evidence of any capsule-formation.

I can find no description of cystic tumors of the uterus (except hæmato and hydrometra, and distentions of remains of Gärtner's canal) except in connection with fibroids. These cysts contain blood, lymph, mucoid tissue, or the products of sarcomatous degeneration.

In the great majority of cases the fibroids have been of the subperitoneal variety, so that the cysts have been attached to the uterus by means of a pedicle. In a few instances there has been no pediculation. In the interesting case of Tillaux, already mentioned, the whole uterus seemed to be distended so as to resemble a hæmato or hydrometra, the cavity appearing to have become continuous with the fundal portion of the normal uterine cavity; it was shut off from the lower portion of the latter by several submucous fibroids.

In the next place as to the nature of the cyst. I think that there is a strong presumption in favor of its being an accumulation of blood. The contents removed at the operation consisted almost entirely of old broken-down fluid blood. The history points in this direction, though not conclusively. The tumor grew rapidly in the last few months, several attacks of pain and weakness having accompanied the increase. The patient believed that the trouble began about a year before her operation, after a severe strain from lifting, at a time when she had passed the menopause for two years.

It is very interesting that such a change should occur in a uterus two years after the change of life, when ordinarily it is atrophied, fibrous, and poorly vascularized. I think the explanation is probably that there existed in the fundus of the uterus a varicose condition or cavern-

[1] Diseases of the Ovaries. London, 1872, pp. 194–199.

[2] Ein Beitrag zúr Lehre v. den kystischen Myomen des Uterus. Arch. f. Gynaek., 1875, S. 531.

[3] Beitrag z. Lehre v. des lymphangiectatischen Fibromyomen d. Uterus in pathologisch-anatomischer in klinischer Beziehung. Arch. f. Gynaek., 1876, S. 414.

ous angioma, and that, owing to the sudden strain, rupture of a sinus-wall took place, leading to the formation of a blood-cyst in the fundus, which gradually increased in size.

I have already pointed out the numerous blood-spaces in the wall of the cyst, as well as the angioma-like mass in the pedicle.

Cavernous angioma of the uterine wall was first described by Klob;[1] lately, Boldt[2] has described a most interesting case with great care.

A similar condition has, of course, been long described as occurring sometimes in certain fibrous tumors—the so-called *myoma teleangiectodes seu cavernosum* of Virchow.

It is well known that this condition may give rise to a large blood-collection in a fibroid, as in the case of Leopold,[3] and it is therefore not unlikely that a similar condition in the uterine wall might be followed by a cystic accumulation of blood.

It is known that a blood-collection may form in the broad ligament from the rupture of varicose veins in the broad ligament.

Possibly in this case the strain which the patient received in lifting may have led to rupture of the wall of one of the blood-spaces, the resulting swelling in the fundus becoming noticeable to the patient as an abdominal swelling about six months later.

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## A CASE OF PAPULO-ULCERATIVE, FOLLICULAR, HYPHOMYCETIC DISEASE OF THE SKIN; AN UNDESCRIBED DISEASE.

By Louis A. Duhring, M.D.,

and

Milton B. Hartzell, M.D.,

of Philadelphia.

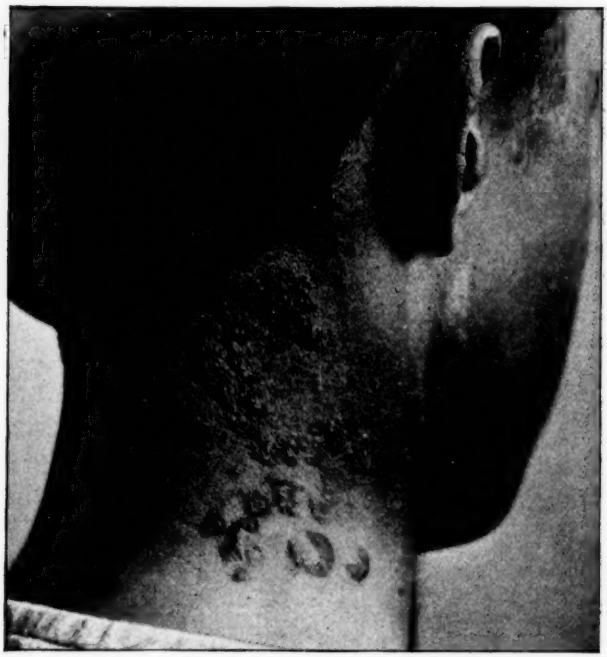
C. S., a lad, aged fifteen years, a mill-hand, applied at the Hospital of the University of Pennsylvania for the relief of a patch of chronically inflamed, papular and papulo-ulcerative, slightly crusted lesions occupying chiefly one side of the neck. The disease had existed three years. The lesions composing the patch, he stated, underwent change from time to time, usually terminating in the course of several months in superficial atrophy of the skin in the form of slight, whitish, pitted, irregularly shaped scars. Itching was not complained of.

Upon inspection the disease was found to be peculiar, and a positive diagnosis could not be made. The patch resembled a mild expression of lupus vulgaris verrucosus more than any other well-known disease, and the indolence and slow course of the lesions followed by scarring

[1] Pathol. Anat. d. Weib. Sexual-Organe. Wien, 1864, S. 173.
[2] Amer. Journ. Obst., Dec. 1893.
[3] Arch. f. Heilk., 1873, S. 414.

helped to favor this view. There was no resemblance to acne, acne-cheloid, sycosis, or tinea sycosis. The regions invaded were the sides of the neck posteriorly, mainly the right side, and to a slight extent the flexor surfaces of the forearm. The patch on the right side of the neck (as shown in the photograph) was of irregular, rounded form, composed of numerous discrete and confluent, firm, irregularly shaped, dull-reddish, chronic papular, papulo-squamous, and papulo-crustaceous lesions. They manifestly represented different stages of the disease. Where several of these lesions were aggregated or confluent small patches were formed.

FIG. 1

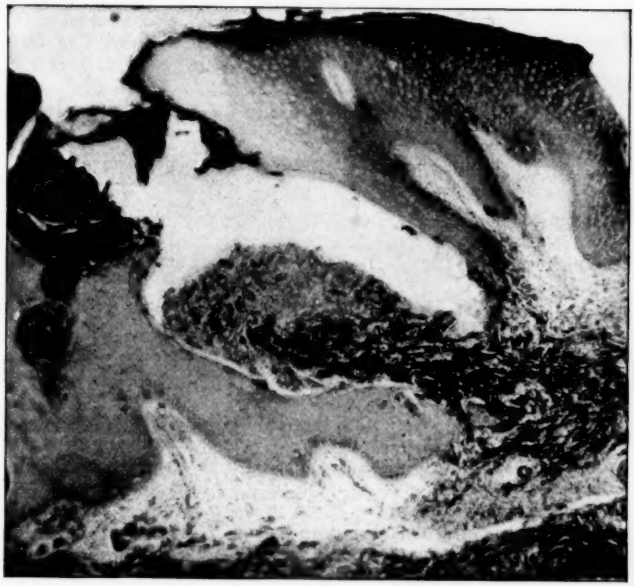


Showing general character and distribution of lesions.

There were some discrete outlying lesions. In several localities a distinct crescentic configuration existed. To the hand the diseased area felt warty and rough, owing to the scales and little crusts on the surface of most of the lesions. Upon removing these, and they existed especially on lesions in an advanced stage, small follicular ulcers were noted. The follicular involvement, however, was not obvious to the unaided eye in all the lesions. That the process was a superficially destructive one was shown not only by the slightly crusted, pit-like excavations, but also by the presence of superficial, whitish, acne-like scars, which, upon the healing of the little ulcers, were left behind. These atrophic

spots, varying in size from a pin-head to a small pea, were numerous and conspicuous, though nowhere were they deep. The central portion of the main patch especially showed these superficial scars. It was evident that the disease was extending on the periphery, but not regularly, and that the central portion had partially cleared away with scarring. But the extension was in no sense sharply defined or marginate, as in tinea circinata; nor was there anywhere any indication of a creeping or serpiginous course. It was, however, suggested that the disease might possibly be due to the growth of some fungus, perhaps the trichophyton, for one of us (Dr. Duhring) had seen a somewhat similar remarkable case many years before, occurring on the hands, which examination showed to be due to the trichophyton.

FIG. 2.

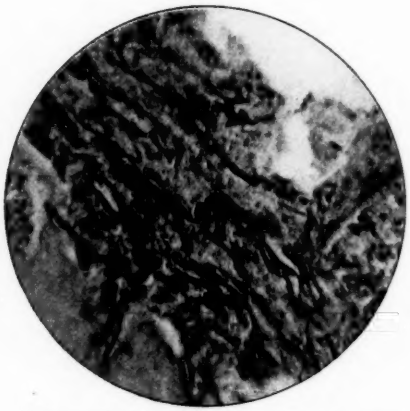


Follicle containing cellular débris and fungus (low power).

With the aid of cocaine anæsthesia lesions were excised from the patches upon the neck, fixed in alcohol, imbedded in paraffin and cut and mounted serially. Several lesions were thus examined, and the same alterations found in all. The rete mucosum was markedly thickened, the papillary layer was infiltrated with small round cells, and the papillæ were considerably enlarged. At the sides of the papules this enlargement was chiefly longitudinal, but in the centre the papillæ were both longer and broader than normal. Sections which passed through the centre of the lesions showed a large downward prolongation of the rete, which contained a cavity of considerable size, opening upon the surface.

This cavity, which occupied the site of a hair-follicle, contained a mass of round cells, granular detritus, altered epithelium, and, what was of most interest, a considerable quantity of mycelium and round and oval spores. The epithelium had disappeared at the bottom of the cavity in some sections, and the mycelium had broken through into the corium, growing between its fibres. In addition to this large cavity there were several smaller ones which did not communicate with the surface, but also contained fungus, together with granular matter. In a few sections isolated mycelial threads were seen growing between the fibrous elements of the corium at some distance from the cavities already described.

FIG. 3.



Mycelium at bottom of follicle. (Zeiss, D.D.: no oc.)

While this fungus resembled in a general way the trichophyton as seen in tinea tonsurans it differed from it markedly in size, being two or three times larger. The spores were about $\frac{1}{2500}$ inch in diameter, while the mycelial threads were from $\frac{1}{4000}$ inch to $\frac{1}{2000}$ inch in thickness. The mycelium was for the most part short, in a few instances branched and jointed, and commonly had club-shaped ends. The spores were few in number, the oval-shaped ones predominating. In sections stained with hæmatoxylon and eosin, and with Biondi's fluid, the fungus elements were, in the first instance, stained a bright rose-red, in the second, a purplish-red, in marked contrast with the tissue elements; in sections stained with alum-carmine the fungus remained unstained, showing as highly refractile threads and spores.

# A CASE OF TRAUMATIC MENINGOCELE; OPERATION, FOLLOWED BY PERFECT RECOVERY.

By Howard Lilienthal, M.D.,
ASSISTANT ATTENDING SURGEON TO MT. SINAI HOSPITAL, NEW YORK; CLINICAL LECTURER ON SURGERY, NEW YORK POLYCLINIC, ETC.

On the 12th of August, 1893, Jacob F., four years old, was brought to my department of Mt. Sinai Dispensary to be treated for a swelling over the back of his head. Three weeks before he had fallen from a first-story window and had sustained a scalp wound. The boy was very dirty, and his hair was matted over a swelling as big as a duck's egg, which was plainly fluctuating. It was a busy day in the dispensary, so I gave the case to my assistant, Dr. D. D. Goldstein, for incision, thinking it to be an abscess under the scalp. Dr. Goldstein, having carefully shaved and scrubbed the part, noticed that something more than ordinary fluctuation was present, and called my attention once more to the patient. On questioning the boy's parents we then learned that he had been for a few moments after the accident unconscious, but that he quickly recovered himself and ran about as usual. He vomited once on that day, but had no convulsion or other suspicious symptom. For nearly three weeks the boy had been well except that an enlargement at the back of his head had been slowly forming. For two days before he was brought to me there had been persistent vomiting, but no other symptom. No chill nor fever had been noted.

Examining the patient very carefully, the swelling was found to be of a thick sausage-shape, running from the most prominent part of the occiput to the left and downward. It was fluctuating, softly pulsating, and could be partly reduced. It became tense when the child cried. When partly reduced, one could feel a crevice in the bone extending vaguely in the direction of the swelling. A fine sterile hypodermatic needle was thrust into the tumor, and clear, non-albuminous fluid withdrawn, about thirty minims in all. The diagnosis of traumatic meningocele was now considered practically certain, and the patient was transferred to my service in the hospital. For the following two days the boy's condition remained unchanged except that the vomiting temporarily ceased. The patient was irritable and apprehensive, crying whenever one but looked at him. On the 14th the tumor had become very tense, and the boy vomited his dinner, so three drachms of fluid were removed by aspiration.

On August 17th I operated. An incision was made around the tumor in the shape of a horseshoe, with the curve above and the pedicle below. I tried to separate the sac from the scalp, intending then to cut off the redundant portion, suture the stump and return it to the cranial cavity. The sac was so very thin and so adherent, however, that it burst at the first attempt. There was no shock, and the child bore the chloroform well, so the operation was continued. The fissure in the left parietal bone through which the meningocele protruded was now disclosed. It was about a quarter of an inch in width, and began quite abruptly about an inch to the left of the junction of the sagittal and lambdoid sutures, whence it extended downward and to the left parallel with the margin of the occipital bone and toward the mastoid process of

the temporal for two and a quarter inches. Here the edges of the crevice came together, and the break extended farther as a closed crack, the end of which I did not deem it necessary to see. Looking into the fissure one could see apparently normal pia covering the brain. With a small sharp spoon I removed that part of the meningocele sac which covered the edges of the fracture, and at the same time thoroughly scraped the bone from inner to outer table, so as to excite new bone-formation. To protect the subdural space from infection a strip of iodoformized gauze was tightly packed into the crevice and was brought out at the left lower angle of the wound. The inner aspect of the scalp flap was now well scraped to free it from the adherent sac, and was sutured back into its old place with catgut. After the operation, which lasted about half an hour, the patient's pulse was 114, respiration 28; temperature 99.6° There was some general collapse, which rendered necessary a stimulating enema of hot water and an ounce of whiskey. Next day the boy's condition was good. Highest recorded temperature 99.2°. On the 20th patient vomited his supper. His wound was dressed the first time five days after the operation, and the deep packing of iodoformized gauze was removed through the angle of the wound. There was some stitch-hole suppuration, but not enough to interfere with the healing of the flap into its old position.

Subsequently the case progressed in an uneventful manner, and the boy was discharged on September 3d, apparently well.

On November 2, 1894, I again saw the little fellow, and there was a sound scar with not a trace of fissure or protrusion.

I have reported this case on account of its extreme rarity and to indicate a method of dealing with such conditions.

The reason for the existence of the meningocele I am unable to give. Fracture of the skull is a common enough accident, while traumatic meningocele is uncommon.

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## LEAD CONVULSIONS.

### A STUDY OF SIXTEEN CASES.

By D. D. Stewart, M.D.,
LECTURER ON MEDICINE IN THE JEFFERSON MEDICAL COLLEGE OF PHILADELPHIA; DIRECTOR OF THE STETSON CLINICAL RESEARCH LABORATORY, ETC.

That convulsions may arise in the course of chronic lead-poisoning appears to have been recognized from the earliest times. About the middle of the seventeenth century, chiefly through the labors of Stockhausen, whose practice lay in a region of lead mines and whose acute observation led to the discovery of the cause of the "Poitou colic," which had been previously described by Citois without its cause being known, it became gradually recognized that cerebral disorders accompanying lead-colic had similar origin.

Most of the medical writers from this period to the time of Tanqueral intelligently mention the varied cerebral phases of plumbism. We owe, however, to the painstaking researches of the latter their first systematic grouping under the term encephalopathia saturnina. So elaborate were his investigations that his treatise on lead disease is still an authority, though published over a half century ago.

Little of recent literature, though including more or less elaborate descriptions of colic, arthralgia, and peripheral paralyses, notice at any length encephalopathy, dismissing it as a rare manifestation occurring solely among workers in lead; and modern writers, in enumerating the causes of certain cerebral disorders characterized by spasmodic disturbances or by loss of consciousness, almost wholly ignore the influence of lead in their production. Thus, Gray[1] makes the unqualified statement that certain groups of symptoms furnish *prima facie* evidence of specific infection. Among these he gives prominent place to "convulsions in the adult, which have not been preceded by convulsions in infancy, and are not of traumatic or of nephritic origin, or due to pregnancy or in an individual subject to migraine;" and further, "a comatose condition extending over days or weeks, not traumatic, meningitic, diabetic, nephritic, or from typhoid fever." Recently Althaus,[2] also in an elaborate paper on "Some Phases of Cerebral Syphilis," discusses freely the comatose variety of specific disease, without mentioning that the coma of lead-encephalopathy presents somewhat identical phenomena. Were the assemblage of symptoms of specific epilepsy and coma as given by these writers alone relied upon, and a diagnosis of cerebral syphilis thus made, the result, if the case were one of lead encephalopathy, might be disastrous, since the management of the affections widely differ. This is especially true of lead convulsion when of precipitate onset and rapidly recurring; for though the iodides freely given in chronic plumbism appear sometimes to exert an effect almost as salutary as in tertiary syphilis, yet in the acute convulsions of lead-poisoning they are contra-indicated, releasing, as they are supposed to do, the deposited metal, permitting it to be carried to the nerve centres to aggravate the already existing danger.

The very high mortality attending acute lead convulsions, unless their early recognition leads to most energetic treatment, and the knowledge lately came to us that they are by no means limited to occupations in which lead is used, and that, indeed, they have perhaps frequently occurred in past years in Philadelphia unsuspected,[3] and are, perhaps,

[1] Syphilis of the Nervous System and its Treatment. Medical News, July 9, 1887.

[2] Medical News, October 16, 1886.

[3] When investigating the wholesale bun-poisoning cases occurring in Philadelphia in 1887, I was told by a thoughtful practitioner of many years' experience, whose clientele formerly lay in the northeastern district—in that part of the city in which all of the bun-poisoning cases I

now occurring in other cities in which the use of chrome-yellow as a food dye is permitted,[1] invests the subject with no little importance.

Of the various forms of cerebral disorder produced by lead, conjointly designated encephalopathia saturnina, the convulsive is by far the most common. The convulsive variety forms two-thirds, if not more, of all cerebral manifestations, and has the highest mortality. The term *convulsions* is here preferably used to designate the cerebral spasmodic disturbances of plumbism, as one less open to criticism than *eclampsia* or *epilepsy*, since it includes all the various forms of convulsive disorder of lead origin. Our knowledge of the intimate pathology of lead convulsions is yet too slight to permit the assertion that they are always due to a primary morbid state of the brain, whether chemical, molecular, or molar. They are often so far eclamptic in character that they lack the preceding general tonic contraction which usually forms the first stage of ordinary epilepsy; and, like eclampsia, the seizures are usually prolonged and have intimately admixed alternating tonic and clonic spasms. Like eclampsia, too, peripheral impressions may be intimately concerned in their onset, if not in their causation, since they often occur during the violence of colic; yet, though reflex disturbances may excite them, their intensity, duration, and lethality indicate that their origin and continuance are most likely dependent upon a primary cerebral disorder.

A careful survey of the literature of lead convulsions and a review of the cases herein reported, which includes all forms hitherto described except the more rare hystero-epileptic type, have convinced me that it is impossible to make any clinically exact systematic grouping of the various forms as Tanqueral did. A rough division might be attempted into an *eclamptic* and an *epileptic* group were the former used as a convenient though loose designation for those forms of convulsions of symptomatic origin not of hysterical or strictly epileptic type. A number of cases that I describe might be so designated, and yet certain others identical with them in many respects as regards symptoms leading up to the seizures, in type as regards the latter, might be classed as epileptic, so that each form blends actually with the other. A distinct and highly important and suggestive class, however, does exist, of which I relate two instances observed by myself, in which the convulsions, though primarily symptomatic of lead-poisoning, indicative of changes so induced in the nerve centres, have become secondarily

reported occurred—that for years the very high mortality attending eclamptic seizures in children, though the latter were carefully treated and were seemingly due to slight causes, had been to him a matter of surprise. He has had since little doubt that most of these were cases of lead-eclampsia.

[1] The unlicensed use in at least one other city of chrome-yellow as a confection dye would doubtless, if investigated, be found to throw light upon many cases of nerve disorder otherwise obscure in origin.

those of so-called "idiopathic"[1] epilepsy, the fit habit probably becoming engrafted upon an already inherently predisposed brain, or one so structurally damaged by saturninism as finally to succumb to its effects as regards healthy functioning. This is in accordance with our knowledge of the pathology of many cases of uncured "focal" epilepsy, or of organic leuetic nerve trouble, whether convulsant or paralyzant—after withdrawal of the primary cause—then, persistence of symptoms, as has been so ably pointed out by Hughlings-Jackson, usually signifies persistence of a residual or secondary cause, one originated by the primary irritant and of the nature of a high instability of certain cells, with constant proneness toward discharge. As I have elsewhere stated, cases of actual epilepsy of lead origin, though rare in literature, may be of much more frequent occurrence than is generally supposed.

The following are brief histories of the sixteen cases:

The first series comprise those in which inquiry would have readily shown the presence of some more common symptoms of plumbism for some time preceding or at least coincident with the onset of convulsions.

CASE I.—Annie H., aged seven years.[2] Source of lead, chrome-yellow buns. She ate of these almost daily for from four to five months before symptoms of poisoning occurred. Noticeably failed in health about the first of June, 1887, three weeks preceding the outbreak of convulsions. Then slight headache appeared, and continued with exacerbations and remissions, increasing almost daily in severity until about June 16th, when it became agonizing and was associated with severe colic, a heavily furred tongue, fetid breath, complete anorexia, nausea, frequent vomiting, and obstinate constipation. Pronounced colic lasted but three days, and without treatment gradually lessened, giving place on June 22d to very severe pains in the knees and ankles, and muscles, about these joints. Arthralgic pains were continuous, with violent headache, until the onset of generalized convulsions on the 24th. No swelling or redness accompanied the joint pains.

On the 23d she was stuporous, frequently shrieking with pains in the head; there were occasional twitching of muscles, with alternate trismus and grinding of the teeth. On the 24th the condition was unchanged until evening, when three violent, generalized spasms occurred, the first lasting five minutes, the second and third from half to three-quarters of an hour, with intervals of coma. From the morning of the 25th, when I first saw her with Dr. Helyer, to 5 A.M. on the 26th, the time of death, she was almost constantly convulsed, with continuous unconsciousness. The seizures on the night of the 25th, from being generalized, limited themselves to the limbs and face of alternate sides; toward the end the left side was alone convulsed, the right being apparently paralyzed. There was a pronounced blue line on the gums. The skin

[1] Using the term in its conventional sense.

[2] Seen through the kindness of Dr. Helyer. This case was briefly referred to in my paper on the sixty-four cases of chrome-yellow poisoning, Medical News, December 31, 1887. Notable quantities of lead were found in the viscera by Drs. Reese and Leffmann. Medical News, August 22, 1887.

was markedly earthy yellow. The urine was free from albumin. Considerable fever was present the last few days.

The following three cases were patients of Dr. A. A. G. Starck. They are the only ones out of the seven fatal cases of lead encephalopathy in Baker Palmer's family of which I have been able to get at all detailed histories:

CASE II.—Mary Palmer, aged eight years; died August 20, 1885. Source of poisoning, chrome-yellow cakes; period of exposure unknown. Patient was very pale and cachectic for some time preceding outbreak of convulsions. The first noticed symptoms attributed to lead appeared about ten days before death. During the first seven days there were pronounced and continuous colic, obstinate constipation, and frequent vomiting of a yellowish fluid. Convulsions, preceded by headache and stupor, appeared on the seventh day. They recurred frequently, with intervals of coma, until death. As lead-poisoning was not suspected in this case by Dr. Starck, a blue line was not looked for. Death was attributed to lepto-meningitis.

CASE III.—Emma Palmer, aged twenty years; died December 13, 1885. Source of poisoning same as preceding cases. Patient had been ailing a number of weeks before medical advice was sought. She had had several attacks of typical lead-colic. The last attack of several days' duration, and with continuous, very severe headache, immediately preceded the onset of convulsions on December 10th. Marked digestive disturbances accompanied the colic, such as fetid breath, anorexia, nausea, frequent vomiting, and obstinate constipation. The convulsions recurred at short intervals, until death on the third day; they were generalized, violent, and prolonged, and consciousness was not regained after their appearance.

In this case there was marked lead cachexia present. A blue line was also noticed. Two and one-half years after death the body was exhumed; lead was found in the viscera.[1]

CASE IV.—George Palmer, baker, aged twenty-two years. Source of poisoning, chrome-yellow cakes. Noticeable symptoms appeared immediately subsequent to decease of Case III. Lead cachexia and a blue line on the gums were present. The symptoms preceding the convulsions were much the same as in Case III., but of less severity. The first generalized convulsion occurred January 20, 1886, while he was at work in the bakery; it lasted half an hour, and was very violent. There were tonic and clonic spasms. Colic and headache, which had preceded for a short time, were more complained of immediately after. The second convulsion occurred three days later in the street. He was thought not to recover consciousness after this seizure. Others followed in quick succession. He was taken to the Philadelphia Hospital, and died there on the following day in a seizure. It was there certified that death resulted from ordinary epilepsy. Two and one-half years after death the body was exhumed along with that of the preceding case; as in it, lead was also found in the viscera.[2]

[1] See Medical News, August 22, 1887.

[2] See report by Drs. Reese and Leffmann, ibid.

CASE V.—Mrs. S., aged thirty years. (The history of this case is given in the analysis of sixty-four cases of poisoning by chrome-yellow dyed cakes. *Medical News*, December 31, 1887.)

CASE VI.—Jacob Mattson,[1] aged fifty-three years; car-driver; temperate habits; no specific history. During a part of 1886 he ate daily for luncheon, for a period of about six months, a half-dozen of the chrome-dyed buns, purchased from Palmer's bakery, the source of the poisoning in the preceding cases. Prior to this he had had for nearly twenty years a chronic diarrhœa, which had been contracted in the army. This gradually ceased, obstinate constipation replacing it, with frequent attacks of typical lead-colic of great severity, usually lasting, remittently, ten days. These attacks were often associated with excruciating pains in the ankles, knees, hips, and elbows, which also occurred at times when colic was absent. Considerable headache developed and great muscular and mental depression. He was then noticed to have cachexia. A marked blue line was present, and the teeth were also greatly discolored by lead. Without then suspecting the source of his ailment, he ceased to eat the cakes for a time, for in abandoning his work as a car-driver he no longer had occasion to buy the bun lunch from the shop. Symptoms of lead-poisoning now gradually disappeared, and he once more returned to his former occupation, resuming, as he did so, from December, 1886, to April, 1887, the daily lunch of a half-dozen chrome-dyed buns. In the early part of 1887 arthralgia and colic, described as of unbearably severe character, reappeared. Colic was of such severity that it is said he would lie for hours upon the floor, tossing about and shrieking aloud for help, and at times even becoming unconscious from its violence. Vomiting was always a feature of the colic. The patient finally became much debilitated in mind and body, was morose, and acted queerly. Colic, arthralgia, and severe continued headache preceded for a few days the appearance of the first convulsion, which occurred on May 7, 1887. There was no aura; he became suddenly unconscious; had generalized muscular twitching, lasting about ten minutes, succeeded again by a general tonic, and that by a clonic convulsion, the whole duration about a half-hour. Stupor followed. When aroused from it he was mildly delirious for several hours. This was succeeded again by a second convulsion, and this by stupor, coma, or maniacal excitement. He had similar attacks on May 10th, 12th, 13th, 14th, 17th, and 20th, and five more at intervals of three to four days, the dates of which could not be accurately ascertained. From three to eight generalized convulsions occurred on each of these days similar to those narrated above. A stuporous, delirious state was constantly present on the intervening days. He was frequently so violent as to require restraint. An interesting feature of the case was the loss of all knowledge of time, the space of ten minutes seeming to him like hours. Colic and joint pains after the onset of convulsions were less marked. Headache, however, persisted. There was no amblyopia. The eye-ground was not then examined. Several months later, while lead symptoms were still present, œdema of the retina and choroid was found, but no changes in the optic nerve. The urine was throughout free from albumin. Lead was found in large quantity while the patient was taking potassium iodide.

[1] I am indebted to Dr. John Thomson for this case.

CASE VII.—David F.,[1] chrome-yellow dyer; aged sixty-four years; of temperate habits; no preceding history of syphilis or epilepsy. Eleven years ago the patient was employed in a dye-house in which the color used for several months was exclusively chrome-yellow. His occupation was sieving the dry chrome. He thus constantly handled it, and the air of the room in which he worked was continually ladened with the dust. After two months' exposure cachexia, headache, colic, and arthralgia developed. He was then compelled to abandon work from mental and physical disability, without being aware of the nature or source of the symptoms. Cerebral disturbances were then more marked than colic and arthralgia. Headache became constant and distressing, with nocturnal restlessness, insomnia, and delirium. There was complete failure of memory, even inability to recall the spelling of his name. In the midst of these ailments, three weeks after work was abandoned, an epileptiform convulsion occurred, lasting about an hour. In it he was constantly convulsed, and frothed at the mouth; unconsciousness and a cry preceded, and stupor followed the seizure. On the third day he had a second convulsion. Under prompt treatment the seizures then ceased. In a short time he then returned to chrome-sieving. After a renewed exposure of three weeks, the symptoms narrated above reappeared with increased severity. He had from six to ten prolonged epileptiform seizures, at intervals of two to three days. He could tell the immediate approach of a convulsion, but cannot now describe the actual form of aura experienced. Active treatment checked the seizures. Work in the dye-house was now finally abandoned; a gradual recovery then followed. No convulsions have since occurred. The urine was free from albumin at the time of the seizures. A blue line was present in the gums. The gums when examined by myself in 1887 still showed a faint bluish discoloration, were much retracted from the teeth, and bled easily on slight friction.

It is interesting in this connection to state that a boy who worked in the same room, and whose duty it was to scatter the chrome-yellow on a sieve, died in convulsions at the time D. F. was affected.

CASE VIII.—Sheridan D., aged forty-five years; carriage-painter for twenty-eight years. No syphilis. No family history of epilepsy or of any neurosis. Habits temperate. Had had occasional attacks of lead colic and arthralgia for twenty-seven years, the first symptoms appearing about a year after he began work at his trade. For a number of years he had had more or less severe frontal headache and was very dyspeptic.

On March 1, 1886, he had the first convulsion. Pronounced headache, worse at night, preceded. A feeling of nervousness and dread occurred as an immediate warning of the seizure. He became suddenly unconscious and fell to the ground while on the street. A companion noticed that there were at first tonic, followed by clonic spasms, apparently resembling an ordinary epileptic attack. Stupor followed the seizure.

On the following day he was well. He had no recollection of what he did immediately subsequent to the seizure; was told that he acted queerly, and that a few hours after the first convulsion that a second

[1] I am indebted to Dr. W. H. Bennett for the history of this case, and for permitting me to see the patient.

similar in character to the first occurred. A third convulsion, also identical with these, happened seventeen days later. Headache and slight colic preceded. For some months previous to these seizures his left hand and forearm had felt numb, and at times were the seat of a tingling sensation. There seemed to be slight loss of power at that time not evident when examined later.

Two other generalized convulsions occurred a few months apart, shortly after the first three. He was then given potassium bromide and iodide in full doses. These he took almost daily for two years. The bromide was then taken alone once or twice daily, with occasional intervals of two weeks. Up to the time he was last seen (January, 1891) the attacks of major spasm had not recurred, though he had had a number of slight spells of the nature of petit mal. He was then doing but little carriage-painting.

This case is of special interest because of the absence of pronounced symptoms of lead-poisoning, causing its nature to be overlooked by several physicians, among whom was a neurologist of some note. Though there was no indication past or present of specific infection, by exclusion, lead-poisoning not being considered in reaching an opinion, a diagnosis of cerebral syphilis was made by the latter. I first saw the case in 1887. He was then recovering from an attack of lead-colic of six weeks' duration. There was an extensive blue line in the lower gum, and the teeth were much discolored with lead. His urine contained no albumin; an examination for lead was thought unnecessary, symptoms of poisoning by the latter were so evident.

In all of the preceding cases typical lead cachexia, colic, joint pains were present, and, in those examined for it, a blue line was found preceding the outbreak of cerebral symptoms, so that the diagnosis should have been a matter of comparative ease, though the source of poisoning in all save Case VII. was so unusual as at the time to escape the notice of the attending physician.

In the following series, though all gave evidence of more or less depreciation in general health, with sallow skin, suggestive of lead intoxication, and several showed digestive disorder, a lack of the common symptoms of plumbism preceding the outbreak of the eclampsia, and the unusual and at first unknown source of the poisoning, render the case not only obscure but unusually interesting from the standpoint of diagnosis.

CASE IX.—Mary D., aged five and a half years, one of seven children, all in good health at the time of illness in this case. No convulsions; no neurotic family history. In December, 1886, had a mild attack of pertussis, the terminal stage of which was present at the date of the appearance of the convulsions. The spasmodic element had been so slight from the first that the nature of the cough was doubted and no physician consulted. She had not been confined to the house, and ate with the family. For a few days preceding the outbreak of the convulsions it was noticed that she was restless and sleepless at night, and through the day frequently vomited what was thought to be bile. The

parents thought the symptoms represented a mild digestive disorder. Constipation had not existed. Convulsions appeared on January 8, 1887; they were violent, long continued, local, tonic and clonic; the tongue was frequently bitten. All measures adopted to check the spasm were unavailing. There were at least thirty-five general convulsions. Death ensued in eight hours subsequent to the first seizure. The case was reported to the Coroner by the physician in attendance, as it came under observation within twenty-four hours of its decease. No autopsy was made. Source of poisoning, chrome-yellow buns; the patient's diet had consisted almost exclusively of them for a period of two weeks prior to death.[1]

Case X.—Louisa D., aged three and a quarter years, sister of the preceding case, had a mild attack of pertussis at the time convulsions appeared. A slight whoop was first noticed in the cough about January 10, 1887. On January 23d she complained of not feeling well, and had several spells of vomiting, repeated on the following day. On the afternoon of the 24th, while about the house, shortly succeeding an exacerbation of cough, she complained of nausea, and called for a vessel in which to vomit. During emesis, convulsions appeared which continued, with brief intervals of stupor, until death occurred within twelve hours after the first seizure. Treatment by full doses of potassium bromide and chloral, instituted by the physician in attendance, was of no avail. The bowels were believed to have been moved daily. They were open on the morning of the 24th. It was recalled by the parents some time after the death of this case and that of the preceding, that each for a few days preceding the appearance of convulsions complained occasionally of "stomach-ache." It was probably of no severity, as no relief was sought for it. Case X. was said to have lost color about two or three weeks preceding death. She ate the poisoned buns largely for about thirty-two days before the onset of convulsions.[2] Death was attributed by the physician in attendance, as in the preceding case, to simple eclampsia. No necropsy. Five months later the body was exhumed. Lead was found in notable quantity in viscera.[3]

Case XI.—William D., aged fifteen months. (This case was reported in "Notes on Some Obscure Cases of Poisoning by Chrome-yellow," *Medical News*, June 18, 1887.)

Case XII.—Lewis D., aged seven and a half years (for history see *Medical News*, June 18, 1887).

Case XIII.—Mrs. D., aged thirty-seven years; mother of Cases IX., X., XI., XII., XIX. At the date of eclamptic attack she was in the eighth month of gestation. Had always been healthy, though during the three preceding pregnancies had noticed, as in this one, some swelling of feet and ankles. She had never had a convulsion of any sort

[1] See my paper "Notes on Some Obscure Cases of Poisoning by Lead Chromate," Medical News, June 18, 1887; for detail of points relating to discovery of source of poisoning and period of exposure, see my report on "A Series of Cases of Poisoning by Chrome-yellow, used in Coloring Buns." Transactions of the Pennsylvania State Board of Health, 1887, p. 293, *et seq.*

[2] The calculation was made from the time the family first began purchasing from the baker, whose specialty was fancy cakes and tea-buns. It is stated that these last, which were very highly colored with chrome-yellow, formed, with milk, almost the sole breakfast and supper of all the family save the father, who alone escaped poisoning.

[3] See report by Drs. Reese and Leffmann, before referred to.

until April 24, 1887. For the space of a week or two preceding this there had been present supraorbital pains and sensations of numbness and tingling in the feet. The bowels were somewhat constipated. Urine was normal as to quantity and specific gracity, but contained $\frac{1}{6}$ per cent. albumin. Quantitative examinations for urea were not made.

On the morning of April 24, 1887, while at work about the house and feeling quite well, she was suddenly seized with a severe epileptiform convulsion lasting ten minutes. After an hour's interval, during which she lay in a semi conscious state and vomited a great deal of bile, a second convulsion occurred, which continued, with very slight intermissions, a half-hour, followed by an attack of maniacal delirium of three hours' duration. Very prompt treatment brought her about, and the convulsions were not repeated. She was placed in recumbency, upon an exclusive milk diet, and went to full term without accident.

The convulsions are thought to be undoubtedly plumbic in this case, because of the knowledge of the ingestion of lead; the appearance of convulsions at the time the other members of the family were similarly affected; the presence of certain other signs of plumbism, such as a slight though undoubted blue line in the edge of the gum about the lower central and lateral incisors; the continuance of headache, and the persistence of pains in the joints and of anæsthesia in the extremities for a considerable time after delivery, when albumin had entirely disappeared from the urine.[1] As is stated above, the urine was normal in quantity and in specific gravity prior and subsequent to the attack. It was not then examined for casts. Examinations were made later, while a trace of albumin was present, with negative result.

Case XIV.—Amelia D., a finely developed girl of twelve years, daughter of Case XIII. For several months preceding the outbreak of eclampsia she became debilitated and anæmic. Her color, which previously had been good, grew of a decidedly earthy hue. There were restlessness and sleeplessness at night, and a light, cheerful disposition gave place to moroseness and taciturnity. No complaint of illness was made until several days prior to May 12, 1887, the date the convulsions appeared. She then seemed listless and despondent, and complained of severe headache and of feeling "bad all over." She had frequent spells of weeping when alone. There were nausea, complete anorexia, heavily coated tongue, and a very fetid breath. On May 11th the headache grew intense. It was located principally in the frontal and occipital regions. There were constant slight nausea and occasional vomiting of a greenish-yellow biliary fluid. She was seen professionally for the first time on the morning of May 12th; had passed a restless, sleepless night, the headache continuing and increasing in severity, and now for the first time she complained of pain in the knees and ankles, which showed no evidence of rheumatism. The breath was highly offensive; the tongue very heavily coated, particularly at the posterior portion. The fusiform papillæ were prominent, and the tips along the left lateral edge were of a deep black color. There was a blue line in the margin of gum in the lower central and lateral incisors. Nausea was constantly present, and while I was examining her she vomited

[1] A history of this case, eighteen months subsequent to the date of the convulsions, was published in Medical News, January 26, 1889. She has since borne another child without complications. She and the three surviving children who were poisoned have, since recovery, remained in good health to the present.

considerable bile. Temperature was 99°; pulse 130; respiration not accelerated. The bowels were stated to have been moderately well opened daily. Colic was not present, nor tenderness on pressure over the abdomen or along the nucha or spine. Urine was free from albumin. A calomel purge was administered, followed by a saline. Two loose, exceedingly fetid passages occurred in a few hours. Chloral and potassium bromide were then given in full doses to alleviate headache and restlessness, which increased notwithstanding. Vomiting continued at intervals through the day. At 11 P.M., shortly after vomiting, a severe general convulsion occurred, lasting about fifteen minutes, succeeded by unconsciousness, from which she could not be aroused. A second seizure similar to the first followed in less than a half-hour, preceded by grinding of the teeth and great restlessness, coma continuing. Morphine and atropine, in combination, were twice administered hypodermatically. Full doses of chloral and potassium bromide were given by the mouth. When seen early the following morning the convulsions had not recurred. She had had a restless night. Headache was now even more severe than on the preceding day. The tongue continued heavily furred and the breath offensive. Five grains of calomel were given, but without moving the bowels. A large blister was applied to the nucha, coincident with the raising of which the headache somewhat ameliorated. A chloral and potassium bromide mixture which had been ordered to be continued through the day was, through an oversight, not administered. The convulsions recurred at 5 o'clock the same afternoon, and continued at frequent intervals until death on the following afternoon—May 14th. The spasms were frequent and generalized until four hours preceding death, when paresis of the left arm and leg occurred. They were then confined to the opposite extremities, but especially to the arm and face. The pupils were moderately contracted and insensible to light. Stertor and coma succeeded the spasms. At times intense restlessness was present in the intervals. Consciousness was entirely lost with the onset of the first seizure, and not again regained. Œdema of the lungs, bronchi, and trachea developed seven hours before death. Profuse moist rales were then present in the chest and throat, and frothy mucus, blood-streaked from the bitten tongue, appeared at the mouth and nose with each expiration. A half-hour preceding death stertor gave place to well-marked Cheyne Stokes' breathing. The temperature, which was normal at first, subsequently was not found to exceed 102½° F. It was not taken within two hours of death.

All efforts to control the seizures after they became continuous were unavailing. Chloral and bromides were given freely by mouth and rectum, and ether inhalations were practised from the first with the onset of each convulsion, and occasionally amyl nitrite was used. Hyoscine hydrochloride was given subcutaneously after the failure of chloral and bromides, but it was not repeated, as the frequency of the spasms seemed to increase under it. Ice was applied to the head where the latter seemed hot. The blistered neck was not permitted to heal. Counter-irritants to the legs were without influence. An unsuccessful effort was made to move the bowels on the 14th, by the administration of three drops of croton oil; this not acting, two large stimulating purgative enemata were given. These were not rejected.

The brain weighed 53¾ oz. av. The brain and meninges were congested. The fibrous tissue about the base, and particularly in the

neighborhood of the straight sinus, was thickened. The lateral and fifth ventricles were somewhat dilated and contained more than the average amount of fluid. Microscopically many of the arterioles showed irregular dilatations. In the cerebellum the corpus dentatum was ill-defined and, in parts, thickened. Lead was found in the spinal cord and kidneys, the only viscera examined for the metal.

The following cases are of distinct character from the preceding. They are best described as those of lead epilepsy.

CASE XV.—John K., aged thirty years, journeyman baker. Prior to July, 1887, when he first came under my observation in the medical clinic of the Jefferson Medical College Hospital, he for several years had worked in a bakery where chrome yellow was used as a cake-dye, and had himself been a free eater of the products of the shop. So far as he could tell, the family history was negative as regards neuroses or epilepsy. He had never had a convulsion until this time. He had led a temperate life and had not had syphilis. The first epileptic seizure occurred in the summer of 1884, while he was at work in the bakery. After three years he could not recall that he had had any remote or immediate warning of the attack. The seizure apparently presented the phenomena of ordinary idiopathic epilepsy. He fell with a cry, grew stiff, and then was generally convulsed, frothing at the mouth. The tongue was bitten. The duration of the seizure was about five minutes. It was followed by a deep sleep lasting several hours. Since the first seizure similar ones have occurred irregularly, sometimes almost daily, for two or three weeks, and then the intervals were three months. Recently, shortly prior to July, 1887, nocturnal seizures had replaced the diurnal; but occasionally minor attacks occurred through the day. There was nothing in his appearance, when seen in 1887, to suggest especially lead-poisoning. The skin was sallow, but a saturnine cachexia was absent. There was a purplish line in both gums. He was dyspeptic, and had had at intervals during the preceding three years occasional attacks of colicky pain, though not of the character of lead-colic. Constipation had been quite obstinate throughout the three years, and headache had occasionally occurred, the latter of more severity subsequent to than before a seizure. The knee-jerks were exaggerated. There was no evidence of any disorder of sensation or motility. Eye-ground was normal. Urine contained no albumin, but lead in large amount. He was under observation for a few weeks, and then ceased to return to the clinic. Subsequent efforts to discover his whereabouts have been unsuccessful.

CASE XVI.—Joseph D., aged thirty years, dye-handler.[1] No specific or neurotic history; habits temperate. When fourteen years old he began the preparation and mixing of various kinds of dyestuffs, among which were especially orange and yellow-chrome. His hands, face, and clothes were constantly stained with the colors, and the atmosphere of the work-room was often ladened with dust from the dyes. Convulsions appeared when he was seventeen years old, and have continued to the present. His health had been very good previous to the seventeenth

[1] It is interesting to note that the father of this case was a block-printer, who made use of lead in his trade. He frequently suffered from lead-colic. His wife asserts that he died of Bright's disease, which his physician said had been induced by lead-poisoning.

year, although since he began handling dyes his skin had become sallow and his bowels obstinately constipated. The seizures presented all the phenomena of ordinary epilepsy; there is an aura, usually visceral, described as something rising from the stomach to the head; instantaneous loss of consciousness occurs when the sensation reaches the throat or the head. He then falls with a cry. The auræ are described as consisting of a smacking of the lips and efforts at swallowing, or in a sudden pain in both temporal regions, or in a feeling of sudden emptiness in the vertex. In a number of observed seizures there is a tonic contraction in which the head and eyes are rotated to the left, with complete or partial opisthotonus. This is followed by a generalized clonic spasm. The whole duration of seizure is from two or three minutes to ten minutes, followed at first by coma, and then by stupor or sleep, lasting two or more hours, after which he awakens with headache and dulness of mind. Maniacal excitement will sometimes precede and sometimes alternate the ordinary seizure. Suicidal or homicidal mania is then often shown. During the first three or four months after the onset of the epilepsy the intervals between the seizures were from two to five weeks; they then diminished to two or three days, and, after a year, the seizures often occurred from once to twice daily. This compelled him to abandon work, though unaware of any connection between his trade and the occurrence of the convulsions. The frequency of the fits now lessened, and at his twentieth year, when two years from his trade, the convulsions ceased, and none occurred for two and one-half years. He had then returned to the work of dye-mixing, and was as much exposed as before. The seizures now recurred with increasing frequency. He deteriorated so much mentally and physically that, in 1887, his mother removed him finally from work. He first came under observation in 1888 in the Jefferson clinic. I have followed his case up to two years ago. When he was first seen the fits occurred about every day or so. There was nothing in his appearance to suggest lead-poisoning, nor could I find by the most searching inquiry that he had ever had unequivocal symptoms, save perhaps obstinate constipation and attacks of slight ephemeral colic, which had been present from the time he began work in the dye-house. For a number of years he had had pains about the knees and ankles, along the spine, and in the shoulder-joints. They were of considerable severity, but lasted only a few days at a time. Apparently they were of the nature of lead arthralgia. His mental condition was very poor. The gums were much retracted from the teeth and bled easily on slight friction. There was a bluish-purple line in the upper gum. The teeth were much discolored, having on their crowns what appeared to be a deposit of lead sulphide. The tongue was flabby, heavily coated, and tremulous. The breath was highly fetid. The skin was sallow and cachectic. He suffered much from indigestion.

The urine was examined several times by Dr. Leffmann, and lead found on each occasion—twice in considerable amount. There were no eye-changes.

At first, on full doses of potassium iodide and bromide, he improved and was able to work in a machine-shop. The improvement, however, was not long maintained. When seen two years ago the convulsions were as frequent and violent as formerly, and the mental condition showed even greater evidences of deterioration.

The duration of the period between first exposure to lead and the development of cerebral symptoms is a variable one, depending upon several factors, the chief of which are probably inherent susceptibility (age and sex) and severity of poisoning. In some cases convulsions may occur surprisingly early; in a less number their advent may be delayed for years, during which more or less constant symptoms of plumbism may be manifested. In one of my cases convulsions appeared on the fifteenth day after exposure; in thirty-two days in a second, thirty-three days in a third; a trifle less than three months in a fourth and fifth; four months in a sixth; four and two-thirds months in a seventh; about six months in an eighth, and in a trifle less than eight months in a ninth.[1] In a tenth, a coach-painter, in whom there were no indications of renal disease, the period of exposure extended over a period of some twenty years. In the remaining six I could not ascertain with certainty the exact intervals.[2]

Those of my cases in which convulsions appeared earliest were children. The instability of the nervous system of these naturally renders them the more susceptible.

It is generally thought that a more continuous exposure, which is equivalent to severer poisoning, is required to cause cerebral symptoms than to produce cachexia, colic, and arthralgia, the usual manifestations of plumbism; and for this reason Naunym[3] has asserted that cerebral accidents occur only among workers in lead, in those whose occupations favor a copious absorption of the metal. Bramwell[4] regards this as an important point in diagnosis. He states that he is unaware that cerebral accidents occur in plumbers, painters, and others who so commonly suffer from the milder manifestations of plumbism, but that they are limited to those employed in the manufacture of lead compounds. Though this is perhaps true in most cases, too great dependence upon occupation as a factor in diagnosis may readily lead to error. Cases have been recorded occurring in file-grinders, and Putnam[5] has reported several suggestive cases of epilepsy

[1] This case (VII.), after two months' handling chrome-yellow colors in a dye-house, developed such pronounced symptoms of plumbism that he was compelled to abandon all work. There occurred colic, arthralgia, and headache. Within six weeks after a return to the same employment, after a four months' respite, he had convulsions coincident with the recurrence of other plumbic symptoms.

[2] In ten other cases (adults) reported in the past two decades by various clinicians—the only cases in which I have been able to find the intervals stated between first exposure and the appearance of fits—the interlapses are respectively: eighteen days, three months, nine months, three years (two cases), five years, twelve years, fourteen years, and seventeen years. So that convulsions appeared in twelve of these twenty cases within ten months, in four between two and five years, and in the remaining four between twelve and twenty years. It therefore appears that the majority of cases of plumbism that develop convulsions do so at a comparatively early period after exposure.

[3] Ziemssen's Cyclopædia.

[4] Intra-cranial Tumors, p. 129.

[5] Boston Med. and Surg. Journal, August 4, 1887.

in the urine of which lead was found: the only discoverable source of poisoning in these last was drinking-water. Tanqueral, in France, found painters of buildings only less susceptible to lead encephalopathy than manufacturers of lead compounds. He recorded cases occurring among plumbers and painters. Numerous cases are also mentioned in current French and German literature occurring in painters and in glaziers of pots.[1]

None of my cases was engaged in the manufacture of lead compounds. One is a coach-painter, who for a year or so before the onset of convulsions used chrome colors. Two were handlers and mixers of chrome-yellow in a dye-house. Two were bakers who used chrome-yellow[2] freely as a cake-dye, and, unaware of its poisonous nature, ate the products of the shop. Poisoning in the remaining eleven occurred through eating the lead-dyed cakes. The fondness exhibited for the dyed buns by the poisoned was remarkable. Inexpensive in price, attractive and wholesome in appearance, they were often the staple food of many families at breakfast, lunch, and supper, and at these meals frequently replaced bread. As chrome-yellow was unsparingly used in their composition, it is not surprising that profound lead intoxication occurred early through their consumption.

It is well recognized that, preceding the development of the cerebral manifestations of plumbism, certain remote and immediate symptoms are common. When present, the assemblage of the former, representing at least such characteristic signs of lead intoxication as a blue line, cachexia, colic, arthralgia, or paralysis, prevents errors in diagnosis which might otherwise arise. Of Tanqueral's seventy-two cases of lead encephalopathy, exhibiting various forms of cerebral disorders, but six showed no premonitory symptoms. Out of twenty-eight cases of lead convulsions the histories of which are reported in the past two decades,

[1] A most appalling series of cases of lead encephalopathy occurring in a pot-glazier's family was reported by Berger in the Berl. klin. Woch., March 16, 1874, and is worthy of mention in this connection. The poisoning occurred through handling the melted lead oxide used in glazing, and especially through constantly living day and night in the pottery in an atmosphere saturated with lead fumes. The father suffered from the comatose variety of lead encephalopathy. Seven sons and daughters died in lead convulsions; four other sons and daughters had frequent apoplectic and hemiplegic attacks of lead origin, and suffered from peripheral neuritis. All the children of their sons and daughters suffered from epileptic and choreic attacks, and several died between the ages of six and ten years in convulsions.

[2] It is of interest to note that the form of lead originating the poisoning in all the cases that I report, save, perhaps, Case VIII., was that technically known as chrome-yellow. The term *chrome-yellow* is generally, though very improperly, used interchangeably with *lead chromate*. These substances are not identical. A series of samples selected as being typical of good commercial chrome-yellow, obtained from various sources, were analyzed by William Glenn, a well-known Baltimore chemist. His results show that chrome-yellow is a very variable compound of lead sulphate, oxide, and carbonate. Efforts continued for nearly a year were resultless in finding a single sample of lead chromate sold as chrome-yellow. Samples of that used as a cake-dye in my cases contained 14 to 32 per cent. of lead chromate; 18 to 20 per cent. of lead sulphate, and 47 to 60 per cent. of white lead (lead oxide and carbonate). As to this point see Science, May 3, 1889, p. 348.

colic is noted as preceding for a variable period in twelve. Colic was more frequently observed than paralysis or arthralgia, but was of less common occurrence than anæmia, the typical cachexia, and a blue line in the gums. The pre-existence of ordinary symptoms of plumbism apparently depends largely upon the duration of the period of exposure prior to the appearance of cerebral accidents. Should it happen, as is often the case, that convulsions appear early, only immediate if any premonitory symptoms may be looked for, except, perhaps, some anæmia and a blue line. In eight of the sixteen cases I here detail (Cases I. to IX.) the ordinary symptoms of lead intoxication were more or less decidedly evident for some time preceding the onset of the convulsions. All of the eight had colic. In most of them it was associated with frequent vomiting of a yellow-colored fluid resembling bile. In one of the eight (Case IV.) severe colic was not complained of until immediately succeeding the first convulsion. It then continued for two or three days, following which a second spasm occurred, rapidly followed by others. These continued until death. In another of the eight (Case V.) colicky pains rather than distinct paroxysms of lead-colic occurred. In this case attacks of nausea and vomiting were more prominent than symptoms of colic. Similar colicky pains, without any distinct attacks of typical lead-colic, occurred in one other of the cases (Case XVI.).

Very severe arthralgia was present in but two (Cases I. and VI.). In two others (Cases V. and VII.) joint pains, though more or less constant for some time, were of no great severity. As far as could be ascertained, vomiting and pronounced constipation occurred as a remote prodrome only in the cases with colic. As a precursor of convulsions, vomiting was present in several others who exhibited none of the more common symptoms of plumbism (typically Cases IX., X., and XIV.).

Paralysis of the extensor muscles of the forearm (wrist-drop) did not occur in any of the sixteen.

The blue line was presumably present in all. Circumstances did not permit a search for it in all of the sixteen. In those cases, however, in which an *intra-vitam* diagnosis was made the line was invariably found. In several in whom the poisoning was recent, unless on the watch for it, the line might have escaped notice, as it consisted of but a narrow bluish-black streak in the margin of gum about the neck of one or two bicuspids or an anterior molar.

Evidences of marked impairment of the general health, preceding for some time the advent of convulsions, were manifested by nearly all save those in whom convulsions developed very early after exposure. Many showed an earthy-yellow hue of skin. This was noticed in all of the bun cases. In Cases IX., X., XI., XII., and XIV., occurring in one family, the members of which had all previously been in good health, it was recalled by the parents that for days or weeks preceding the

outbreak of eclampsia all had grown restless and sleepless at night, and were fretful and irritable by day. In all, too, without there being evidences of pronounced colic, indigestion was present, and in several colicky pains occurred. Disorder of digestion was especially marked shortly preceding onset of the spasms in Case XIV., and, to a less extent, in several of the others. In all the cases that I saw arising from eating the poisoned buns there were also present heavily furred tongue and offensive breath.

Most of the chrome-yellow-bun cases, of which an accurate history could be obtained, were noted to have had, for a day or so preceding the onset of fits, severe continuous headache, worse at night and associated with insomnia. In several, notably Case XIV., the headache was excruciatingly severe. With it vomiting was also frequent. In another (Case I.) headache was constantly present for three and a half weeks before the first fit, but was not at first unbearable. It however became so about ten days preceding the convulsions, and continued violently severe, with colic and joint pains, until the outbreak of spasms. Total failure of memory for two or three weeks preceding the outbreak of convulsions was a notable symptom in Case VII., the chrome-yellow mixer. He was cachectic and had had colic and arthralgia, which lessened with the onset of cerebral symptoms. He became unable to recall even the spelling of his name, and had severe constant headache, with nocturnal restlessness and delirium.

In several of the sixteen it was remarkable that no precursors were observed, except in two—vomiting. Case XII. was at play with a sister when the seizures occurred, which terminated fatally, despite active treatment, in twenty-eight hours.

It is regretted that in none of the acute cases of convulsions was an examination of the eye-ground made, so that the likelihood of the existence of optic neuritis, so commonly present in subjects of lead-poisoning with pronounced cerebral symptoms, can only be conjectured. The extreme frequency of the presence of optic neuritis in this class, associated with headache, vomiting, and convulsions, leaves little doubt of its probable existence, though undetermined, in those in whom the cerebral symptoms were severe. In but one of the four cases that I personally saw when convulsions were occurring was the examination feasible. In this, unfortunately, it was omitted.

As regards character of seizure, all of the sixteen, with the exception of Cases VIII., XV., and XVI., displayed more or less the usual pernicious tendency of acute lead encephalopathic seizures in frequency of repetition and lethality of termination. The most typical in respect to immediate precursors and character of seizure are Cases I., II., III., and XIV. These, in addition to premonitory headache, vomiting, and restlessness, and in Cases I., II., and III. to preceding colic and arthralgia, showed

characteristically the above-mentioned tendency. This, without the premonitory symptoms, was also manifest in Cases IV., IX., X., and XII., the other of the eight fatal cases. In Case XII. the collective seizure forming what has been termed the *status epilepticus* lasted twenty-eight hours. At its termination, immediately preceding death, the axillary temperature, from the normal with the onset, rose to 107° F. A similar and indeed greater rise is not uncommon in the *status epilepticus* of idiopathic seizures, as was first remarked by Bourneville. In Case XIV. (sister of Case XII.), in which the collective seizure lasted twenty-three hours, the temperature did not exceed 102½° F. at death. In this case the premonitory symptoms were much more suggestive of an inflammatory cerebral disorder than were those of Case XII.

Cases XV. and XVI., as has been previously remarked, belong to a class distinct from the others. They are of unusual interest, suggesting as they do the likelihood of lead-poisoning sometimes originating so-called "idiopathic" epilepsy. These two cases are not unique. Putnam[1] relates several similar, as do also Schultze[2] and others.[3] Cases of this class may be of not uncommon occurrence. The multitudinous uses to which lead is put in civilized life—apart from the industrial sources of poisoning, the multitudinous accidental and unsuspected ones, a fraction only of which is generally known—render this metal the most ubiquitous and subtle of poisons. A consideration of the innumerable applications that are made of lead preparations may not infrequently throw light on cases of deterioration in health obscurely arising, and likewise, perhaps, sometimes explain the development in those with unstable nervous systems, and especially in the young, of convulsive disorders which, unchecked, eventually gravitate into ordinary epilepsy. There is no doubt that the convulsions of chronic lead-poisoning are sometimes mistaken for those of ordinary epilepsy, resembling the latter, as they may, in character and course. How frequently the error arises even systematic inquiry would still render it difficult to determine accurately. The resemblance between convulsions of lead origin and the so-called "idiopathic" epilepsy may be not only clinical but pathological. We dare not now infer, in the light of recent research, that the mere absence of detectable macroscopic and microscopic changes in the brain of an epileptic necessarily renders the epilepsy *idiopathic*, for in cases of lead encephalopathy terminating fatally the brain has been found to all appearances normal, and yet chemical examination has shown the most vital alterations in the gray matter, sufficient to cause the protean cerebral manifestations of plumbism. Instability of gray matter, its

[1] Loc. cit.

[2] Dissertation, Breslau, 1885.

[3] As regards the same class Gowers (Diseases of the Nervous System, p. 1265) states: I have seen several cases in which convulsions similar in character and course to those of ordinary epilepsy occurred in the subjects of lead-poisoning, without other symptoms, and continued for years after the toxic influence had ceased.

constant tendency toward discharge, the not unlikely cause of the phenomena of epilepsy, seems easy of explanation; though a careful consideration of the investigations of Blyth,[1] to whom we owe the knowledge of the important fact that the specific pathological cerebral effect of plumbism is not merely a structural change, but one of composition not detectable by ordinary means of pathological research—that it consists in a chemical combination of the lead in the brain with the complicated nitrogenous and phosphorized brain-fats, forming a definite substitution-compound to lead cephalin, in which a molecule of hydrogen is replaced by one of lead.

If there be nothing in the character of seizure in certain cases of lead convulsions to differentiate them from the fits of ordinary epilepsy, and the common symptoms of plumbism, as is often the case, be so slight as to escape notice, the observer not being especially on the watch, errors in diagnosis may readily enough occur. The oversight would be, of course, the more venial if, with lack of unequivocal symptoms and presence of obscure and unusual source of poisoning, the case came under observation years after development of the seizures. In Case XV., had I not at the time it presented itself known of the common use of chrome-yellow by bakers, I should not, of course, have especially suspected lead as a causative factor, although the age at which the epilepsy appeared, with a negative history of syphilis, renal disease, and of trauma, would, naturally, have led to an inquiry in that direction. In Case XVI. the convulsions began at the age at which the development of epilepsy is more common. With an utter lack of the more usual symptoms of plumbism, lead-poisoning would not have been suspected as a cause of the convulsions had not the customary inquiries, in developing the history, into various points that might seem to bear on the case elicited the fact already stated regarding exposure to lead in an occupation most liable to originate severe constitutional symptoms. Even then a connection of cause and effect could have been little more than conjecture, had not further inquiry brought out the additional fact of not only origin of fits after exposure, but their cessation on abandoning work, and, again, their re-development with renewed exposure. Systemic intoxication in this case must have been unusually severe, unless a second source of poisoning, though not evident, was present; since, though he had been absent from his trade for a year or more, lead was repeatedly found in the urine,[2] and twice in large amount, as such things go, when potassium iodide was taken freely with the object of eliminating the metal from the tissues.

[1] Journal of Mental Science, January, 1888.

[2] All the urine examinations for lead were made for me by Dr. Leffmann, to whom I am under many obligations for the same.

# REVIEWS.

INVESTIGATIONS ON MICROSCOPIC FOAMS AND ON PROTOPLASM. Experiments and Observations Directed Toward a Solution of the Question of the Physical Conditions of the Phenomena of Life. By O. BÜTSCHLI, Professor of Zoölogy in the University of Heidelberg. Authorized translation by E. A. MINCHIN, B.A., Fellow of Merton College, Oxford. 8vo., pp. 340. Twelve lithograph plates. London: Adam & Charles Black, 1894.

IT is but the natural outcome of the development of the biologic sciences that extensive series of facts regarding the structure and phenomena of living organisms having been accumulated, biologists should more and more turn their attention to the explanation of these facts. It is likewise eminently proper that each factor in the complex phenomena of life should receive careful examination in the light of the exact sciences of mechanics, physics, and chemistry before the biologist shall be called upon to say how far these phenomena may be attributed to the laws of physics, and at what point, if at any, some peculiar form of energy is to be called in.

It is only by establishing upon an experimental basis the explanation of fact after fact, according to known laws, that those vital phenomena may be isolated which demand the existence of some as yet not understood form of energy.

Twenty years ago Houghton pointed out many new and interesting applications of exact mathematical science to the problems of molar movements in animals, and expressed as the result of his studies his belief in a process of evolution of higher from lower forms of existence, according to fixed laws. Marey, Cope, Ryder, and others have since contributed much to the understanding of the mechanical origin of the hard parts of organisms, through the action of interference energies—molecular and molar movements—such as the physical tensions inherent in protoplasm along with other colloid fluids, and the effect of such agencies as impact, friction, and strain. Ryder has grouped these so-called "*kinetogenic*" and "*statogenic*" movements under a general form of energy which he terms "*ergogenesis*."

The emanation of heat, light, and electricity from living organic bodies has received careful study at the hands of various physicists, and the catagenetic processes involved in the elaboration of the carbohydrates, waxes, oils, alkaloids, and proteids, forming the proximate constituents of plants, and of the various secretion and excretion products of animal katabolism, have received most exhaustive attention from the physiological chemist and spectroscopist.

In no case, however, have these researches eliminated the necessity of recognizing the existence of some anagenetic or growth-force, some "vital" upbuilding energy, such as Cope includes under the terms

"*bathmism*" and "*emphytism*;" for example, such a force as is exhibited in the "antichemism" of plants, *i. e.*, the energy which is displayed by the elaboration of living from non living matter. This is a constructive or anagenetic process employing the energy derived from the heat and light of the sun. It is at first confined to the single individual (*autobathmogenic energy*), proceeding as a higher manifestation, to embryobuilding, to the formation of secondary organisms like the parent (*emphytogenic energy*). But the vital phenomena, which are commonly regarded as inexplicable in terms of physics, go beyond the upbuilding of living from non-living matter and the multiplication of the resulting organisms. These latter exhibit on every hand the influence of a growth-energy which is not exhausted by the formation and activity of the individual or species, but which tends constantly to a higher plane of structure and function through the subdivision and specialization of its action, due to special acquired arrangements and rearrangements of the molecules upon which it acts. This highest manifestation of growth-force is seen in the phenomena of evolution, and its various phases are marked by molecular attitudes or groupings, which remain unaltered so long as they keep well within the main axis or current of the growth-force.

It will be seen that there are two lines of biologic thought—the one dealing with a constantly growing list of structure and functional phenomena that may be accounted for under the laws of molecular and molar physics and chemistry; another constantly decreasing list of phenomena to be explained only upon the basis of some as yet not understood growth-force—the ultimate and essential force of life.

While man is constantly learning the properties, states, and relationships of matter which determine the possibility and degree in which this anagenetic force may manifest itself, he has never been able to imitate any of the anagenetic processes, and all attempts to demonstrate spontaneous generation of living organisms have been failures.

The gaze of the biologist, intent on discriminating between the essentially physical and mechanical processes of life and those requiring the action of a special growth-energy, is fixed steadfastly upon the living cell, and every contribution to our knowledge of the cell brings us to a better understanding of the nature and limitations of that growth-force which has, by one of our contemporaries, been deified as "Biologos."

The attitude toward these questions assumed by Prof. Otto Bütschli, than whom none is better fitted by training and experience to speak, is well defined in the following sentences from his masterly work, only recently made available to English readers: ". . . I am convinced that we shall get no farther in these matters by means of speculations upon attractions and contractions, or with the help of micellar and molecular theories; but that we must rather risk the attempt to advance upon the basis of the known phenomena of molecular physics. In any case, I think that by means of this work I shall establish the conviction that in living matter there are no mysterious forces at work, but only those which also prevail in the organic world" (p. 250).

Prof. Bütschli is well known as one of the most thorough students of the protozoa, living. For years he has been one of the most prolific contributors to our knowledge of protoplasmic organisms in their least differentiated forms, and the present work is an attempt to explain the structure and phenomena of living protoplasm on a rational basis capable of demonstration.

The work is divided into two parts, the first of which deals with the investigations upon oil foams and upon protoplasmic structures. The second part takes up the theory of the net-like or reticular structure of protoplasm, and ends with a most exhaustive summary of the divergent views.

It is impossible to present here any adequate idea of the interest with which the student of cell structure must read the accounts of Prof. Bütschli's success in manufacturing oil-lathers or foams,[1] small masses of which exhibit under the microscope the structure and behavior of protoplasm to a wonderful degree. His foam-drops show the alveolar structure of protoplasm, together with its cuticular layer, the granular appearance is imitated, and the granules stream about as in living protoplasm; they creep somewhat rapidly backward and forward under the cover-class; when free from pressure their activity is increased by warmth and electricity up to a certain point, and the direction of movement may be determined arbitrarily by the application of various stimuli to molecular activity, such as heat and substances possessing different surface tensions. The empty cells of thin sections of elder and sunflower pith, after being passed from absolute alcohol to chloroform, are filled with fine oil-foams, rendered transparent with glycerin, whereupon, "in successful preparations, it is then observed that the oil lather contained in each of the pith cells is in lively streaming which persists for hours." It is interesting to note that "nothing was ever observed of a rotational streaming such as occurs in vegetable cells;" the process observed was that commonly spoken of as circulation and so frequently demonstrated in the stamen hairs of tradescantia.

Nowhere is there available a more thorough digest of the conflicting views regarding the structure of protoplasm than is presented here. Only once or twice does Prof. Bütschli show any inclination to abandon the method of calm impersonal presentation, and show the fire of the advocate. Künstler seems to have aroused him considerably by criticisms of his previous comparisons of the structure of protoplasm with the structural relations of a foam, and Bütschli's retort is interesting as presenting his position:

"Any one who takes exception, at the outset, to all attempts to explain the various phenomena of life on the ground that such attempts are devoid of importance, because not made upon the living body or upon protoplasm, renounces at once all possibility of an explanation of these processes; he shows that he does not take their explanation seriously, but thinks it more correct to regard vital phenomena as the outcome of a secret and mystical cause which it is not permissible to touch upon. Whoever, on the other hand, does not share this point of view, will, as little as myself, be of the opinion that I had prepared living protoplasm by means of my experiments, but will admit that bodies were successfully manufactured which not only possess a great similarity to living protoplasm in their structural relations, but also offer certain peculiarities which hitherto were only to be observed in the same manifestation and for the same length of time in living protoplasm. To bring these results to bear upon the explanation of the phenomena exhibited by living protoplasm seems to me not only permissible but even imperative.

"Now, Künstler explains protoplasm not only as a living, but also

[1] Made of olive-oil, potash, soap, and glycerin.

as a 'highly structured' substance. In so far as this statement has reference to structural relations actually observed, and not to such as are supposed to be hidden from us, and to be necessarily connected with the mysterious life of this substance, I can by no means agree with it. Protoplasm, as far as our knowledge extends, is in no way more highly structured than foams artificially manufactured by me; and if it must of necessity possess a very high degree of complexity, it may be confidently predicted that this complexity is to be sought in the province of chemistry, as I have already attempted to explain elsewhere (1891). Finally, according to Künstler, protoplasm must be 'the result of a special development, which can have nothing in common with the mixtures prepared by me.' Now, I think that Künstler will find it difficult to reply if he were asked for a more precise account of this special mode of development, of which protoplasm is the result. I regret to say that I, at least, know nothing definite concerning any developmental history of protoplasm, although I am, of course, greatly interested in it. So far as I have heard, there has been much talk about the growth of protoplasm, and some hypotheses concerning it have been put forward, which, however, only deal with the mode in which complete molecules or micellæ of protoplasm are added to those already in existence; but, as I have said, I know nothing of any special mode of development of protoplasm which could be adduced in opposition to the validity of my attempts to explain certain phenomena of protoplasm."

Prof. Bütschli does not attempt to do more than he here indicates, "explain certain phenomena of protoplasm," and although the artificial imitation of the radial appearance in cell division and of karyokinetic figures strikes one as prophetic of what may yet be learned by the study of "the interaction of physical and chemical forces under definite conditions," there undoubtedly still remains a wide field for the "biologos" or bathmic forces of the biologic metaphysician.

In dealing with the subject of surface tensions we are surprised to note that Prof. Bütschli makes no reference to the interesting studies of Reinold and Rücker,[1] especially the paper "On the Relations Between Thickness and the Surface Tension of Liquid Films," although he frequently refers to Plateau and Van der Mensbrugghe, whose work is corrected and supplemented by that of Reinold and Rücker. The latter investigators show, by direct comparison of the tension of thick and thin films over a range of thickness extending from 1350 to 12 millionths of a micro-millimetre, that there is no evidence that any change in surface tension is dependent on the thickness of the film. In connection with the degree to which pseudopodia may be extended, Bütschli offers no suggestion, except the general statement that the currents in an amœba run "just as if an extension current existed as the result of the surface tension being diminished at the anterior end." This is in accordance with the law that the difference in surface tension in two parts of the same film must produce motion; but the distributing factor remaining fixed, what is to limit the forward motion? It seems that the increased viscosity,[2] due to stretching the cuticular layer; the fact that the thick-

[1] Philos. Trans., Lond. 1881, vol. 172; 1883, vol. 174; 1886, vol. 177.

[2] When the thickness of a film becomes less than twice the radius of molecular action its viscosity increases. The magnitude of the radius of molecular action would appear to be from 3½ to 7 millionths of a millimetre (micro-millimetres), judging from the fact that Reinold and Rücker show that the tension of a film, which is sensibly constant when the thickness exceeds 50 micro-millimetres, diminishes to a minimum, and begins to increase again when the thickness is diminished to from 14 to 7 micro-millimetres.

ness and surface tension of films appear to be affected by the nature of the gas with which the films are in contact; and finally, the fact noted by Sir W. Thompson, that a film is cooled as it is extended, may all have some effect in putting a stop to further changes in surface tension at the anterior end of the moving amœba or elongating pseudopod, and consequently to their movements.

Not only does Bütschli show similarities in structure between his foam drops and protoplasm, but, after demonstrating "that the framework and the intervening substance of protoplasm must be fluid," as in his alveolated oil-lather drops, he goes on to point out the harmony of the investigations of Reinke and Rodeswald upon the enchylema squeezed out from *Æthalium septicum*, with his own conclusion, that the intrareticular substance must be interpreted as an alkaline watery solution; and he completes the chemical resemblance of his foams to living protoplasm by pointing out the probability that the foam-work substance of protoplasm is formed by a body which has arisen from a combination of albuminoid and fatty acid molecules, forming a body insoluble in water. The phenomena of chemotaxis as described by Metschnikoff and others would appear to have a direct bearing on this subject, but it receives no attention, although the much less important chemical hypothesis of Montgomery is referred to. C. S. D.

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DERMATOLOGY: BEING VOLUME III. OF A SYSTEM OF GENITO-URINARY DISEASES, SYPHILOLOGY, AND DERMATOLOGY. By various authors. Edited by PRINCE A. MORROW, A.M., M.D. With illustrations. Pp. 976. New York: D. Appleton & Co., 1894.

THE contributors to this large, imposing, and valuable work on dermatology are writers well known to the profession in this department of medicine. New York City is represented by C. W. Allen, E. B. Bronson, G. T. Elliott, J. A. Fordyce, G. H. Fox, L. Heitzmann, G. T. Jackson, F. J. Leviseur, P. A. Morrow, H. G. Piffard, S. Pollitzer, and A. R. Robinson; Philadelphia, by M. B. Hartzell, H. W. Stelwagon, A. Van Harlingen, and E. J. Stout; Chicago, by J. N. Hyde and J. Zeissler; St. Louis, by W. A. Hardaway and C. F. Hersmann; New Orleans, by H. W. Blanc, I. Dyer, and R. Matas; Boston, by J. T. Bowen; Cleveland, by W. T. Corlett; Montreal, by F. G. Shepherd; and Toronto, by I. E. Graham. These names are all everywhere favorably known in connection with dermatology, and, as a matter of course, command a respectful hearing on the subjects discussed.

The scope of the work as planned by the accomplished editor is on broad lines, the subject-matter and its arrangement being entirely in accord with modern advanced views. The classification of the diseases rests upon a solid foundation, its basis being pathology. Thus Class I. is "Inflammations," including the exanthemata, eczema, and the numerous other diseases of a manifestly inflammatory or exudating nature usually included by authors in this class. Class II. comprises "Hemorrhages;" Class III. "Hypertrophies;" Class IV. "Atrophies;" Class V. "New Growths;" "Class VI. "Neuroses;" Class VII. "Dis-

eases of the Appendages of the Skin;" and lastly, Class VIII. "Parasitic Diseases." This classification is not only scientific, but is of practical use in grouping the numerous diseases of the skin. Viewed as a whole, we are of the opinion that it is difficult to devise a more useful scheme. Up to the present time it has been impossible. It is based upon the old and valued Hebra classification, which has done such good service the world over for the study of these diseases. The weakest part of the structure is the last class, Parasites, which should be omitted, and the subject-matter treated elsewhere.

The volume opens with an excellent chapter on the anatomy and physiology of the skin, by L. Heitzmann, favorably known for his many contributions to the histology of the skin. The illustrations are original, well drawn, and serve to make the text much clearer than could be done without them. We take it they are from the pen of the author himself. The chapters on general semeiology and classification are contributed by Dr. Morrow, and those on general etiology and diagnosis by Dr. Hardaway.

Coming to Part II., Special Diseases, we first meet with the exanthemata, both systematically and fully dealt with by Dr. Graham. They are discussed in a scientific and satisfactory manner. Dr. Piffard, well known for his original contributions to American dermatology, is the author of the chapter on eczema. Considering the frequency and importance of this disease (constituting between thirty and forty per cent. of all the affections of the skin), the space allotted to it is remarkably little in comparison with that which certain other rare diseases receive. Thus, about thirty pages are devoted to eczema, and half as many to dermatitis herpetiformis, one of the rarer diseases. This apparent scantiness, however, is compensated for by the fact that all Dr. Piffard writes is not only very concise but practical. It is impossible more than to allude to one or two of the questions discussed in this chapter. One that strikes us as being worthy of special remark is "eczema of the sebaceous glands," where the author states that under the influence of the stimulus of eczema the glands may exhibit increased functional activity, and the eczematous exudation become mixed with a sebaceous secretion. This condition, the author adds, must not be mistaken for a totally different affection which has received the name of "eczema seborrhoicum," which, in his opinion, is not an eczema at all, nor in any way connected with it. With this opinion we would express ourselves as in accord. The pathological anatomy of eczema is briefly considered by Dr. G. T. Elliott. The treatment of the disease receives due attention, and will be found quite full enough to meet the needs of the practitioner. Mention may be made of the treatment of chronic eczema of the palms and soles by the application, every few days, of the strong (25 per cent.) solution of peroxide of hydrogen, which Dr. Piffard recommends highly. Internally, the most benefit is to be derived from the proper use of arsenic, calx sulphurata, and viola tricolor, indications for the administration of which are given.

With the title dermatitis seborrhoica Dr. G. T. Elliott discusses at length Unna's "Eczema Seborrhoicum," and who, while agreeing almost altogether with Unna's claims in regard to the disease, would deprecate the name eczema being attached to it.

Dermatitis herpetiformis receives full and critical consideration at the hands of Dr. Stelwagon, ample justice being done to the subject. Sev-

eral typical cases are narrated, which serve to accentuate the characteristic clinical features of this somewhat rare disease, now generally recognized everywhere.

One of the most elaborate and lengthy chapters is on leprosy, by Dr. Morrow, who has had unusual opportunities for studying this disease in the Sandwich Islands, as shown by the numerous excellent original photographs which illustrate the article. With these photographs before him the medical man who had never seen a case could scarcely fail to recognize the disease. All the commoner varieties and stages are represented. A photograph by Fordyce shows the bacillus *in situ*.

Among the newer and rarer diseases we note an article by Fordyce on "Multiple Benign Cystic Epithelioma," well illustrated. This disease has been much discussed of late, especially abroad, cases having been reported with various titles, too numerous to quote here. It was thought by many to be a new growth starting in the sweat glands or ducts, but Fordyce believes the formation to be due to masses and tracts of epithelial cells corresponding to those in the lowermost layer of the epidermis and the external root sheath of the hair-follicle.

Another new disease of much interest is keratosis follicularis, which receives consideration from Dr. Hartzell, who is not disposed to accept without further confirmation the view held by many observers that the bodies met with in the tissues are really coccidia. Paget's disease of the nipple is also ably and conservatively handled by Dr. Hartzell, the article having the merit of being concise.

Dr. H. W. Stelwagon writes on molluscum contagiosum, stating his belief in the contagiousness of the disease, and that the cases which have come under his personal observation would go to support this view. The true or exciting cause of the growths, he believes, has not yet been discovered, the psorosperm theory not being proved.

A lengthy and elaborate chapter is given to tuberculosis of the skin, miliary tuberculosis of the skin, lupus vulgaris, tuberculosis verrucosa, and scrofuloderma, all from the pen of J. T. Bowen, and discussed mainly from a scientific standpoint, with the microscope as a foundation. These affections are all regarded as manifestations of tuberculosis. Scrofuloderma is looked upon as a tuberculosis of the subcutaneous tissue, but no mention is made of some of the well-known clinical forms of scrofuloderma which have not only their beginning but their termination in the skin, in no degree involving the subcutaneous tissue, as for example the scrofulous, flat pustule met with chiefly on the trunk and limbs.

Another lengthy chapter is devoted to epithelioma, by Fordyce, the disease being presented in all its details, especially as concerns the pathological anatomy. It is, moreover, illustrated by some excellent photographs. Sarcoma is also considered from a broad position. These two chapters, indeed, are remarkably complete, and in their fulness quite overshadow some of the other perhaps equally important diseases. But discrepancies of this kind are unavoidable in a work the conjoint production of many authors.

In a work which in other respects is a complete treatise on cutaneous diseases we miss any reference to the syphilodermata. This apparent omission, however, is readily explained by the statement that diseases of the skin due to syphilis are treated of in the volume of the work devoted exclusively to syphilis. At the same time it cannot be denied that the syphilodermata are as much entitled to consideration with the

other diseases of the skin as are the tuberculous affections or the scrofulodermata; both are cutaneous expressions of a general disease. Syphilis in all its cutaneous manifestations, from the chancre to the tubercle, belongs properly to dermatology. All lesions that affect the skin, irrespective of cause, should come under dermatology.

Alopecia areata, a disease about which much has been written of late, more especially as concerns its possible or probable parasitic nature, is by A. R. Robinson, who is eminently qualified to discuss the pathology of this disease. He holds that all cases of alopecia in which the patches increase in size by peripheral extension are parasitic, as shown by the anatomy, especially by the inflammatory process in *areas*, at the same time not denying that hair may fall out in consequence of injury to the nervous system. With the exception of general alopecia from shock, he is inclined to believe that nerve disturbance is only a predisposing factor. Such views, we hold, are not altogether in accord with clinical facts, and should not be allowed to pass without a word of protest. There are doubtless causes capable of producing this disease of the nature of which we are ignorant; but to assume that the cause is parasitism, without any observer being able to demonstrate the parasite, is, we think, a premature conclusion. In the treatment parasiticides are practically of no more value than other irritant remedies.

We find urticaria removed from its usual place in classification with the erythematous diseases, and grouped with the sensomotor neuroses. It is described by Bronson, who has done so much to elucidate the subject of the sensory neuroses generally, especially pruritus. This latter disease is also written by him. All are instructive and valuable dissertations on this group of diseases.

S. Pollitzer contributes several well-prepared articles on diseases of the sweat glands, a subject which has heretofore received but little attention among dermatologists, as a recent critical review of the literature by Petersen in the *Archiv für Dermatologie und Syphilis* shows. In Pollitzer's articles special attention is given to the diseases characterized by structural changes in the glands and excretory ducts, such as hidradenitis and miliaria.

The vexed question of seborrhœa is discussed by Dr. Elliott, who, with some other dermatologists, finds it difficult to decide upon a definition of that disease. On the whole, the author finds himself very nearly in accord with Brocq's definition, in which seborrhœa is held to comprise certain affections characterized by disturbances in the secretions of the cutaneous glands, the products of which, mixed with epidermic cells, either concrete upon the surface of the skin or cover it with an oily coating. Elliott would exclude from the category of seborrhœa the variety known as S. sicca, the S. oleosa of the Austrians and the acne sebacée fluente of the French being the representatives of true seborrhœa.

Diseases of the nails, a difficult subject to handle, are ably considered by Drs. Van Harlingen and Stout conjointly, these authors also contributing practical and satisfactory chapters upon tinea favosa, tinea tonsurans and other tineæ, the pages on treatment being especially full. The affections of the hair are written by Dr. G. T. Jackson, a well-known authority on this subject.

The volume closes with a valuable appendix, contributed by Dr. J. Nevins Hyde, Chairman of the Statistical Committee of the American

Dermatological Association, consisting of a tabulated report, compiled by Dr. W. F. Robinson, giving the combined returns of cases observed by the individual members of the Association from June 30, 1878, to January 1, 1893, the sum total of cases recorded being 204,866. The importance and value of this work for American dermatology cannot be over-estimated, and the information is a useful addition to the volume.

A few words must be said in praise of the illustrations, comprising chromo-lithographs, photographs, and woodcuts, most of which are original. Some of the photographs, notably those illustrating certain forms of lichen ruber (from the camera of Dr. G. H. Fox, well known for his great success in photographing cutaneous diseases), are admirable, and show the value of photography for depicting lesions of the skin. We much prefer work of this kind to some of the chromo-lithographs copied from foreign works contained in the volume, as being in every way more accurate and instructive. Several chromo-lithographs of cases furnished by A. R. Robinson (as hidrocystoma, lupus vulgaris, and dermatitis exfoliativa) are notable exceptions, being in keeping with the other many excellent features of the book.

After a careful perusal of the subject-matter of the whole volume, we have no hesitation in saying that the editor and the contributors are to be heartily congratulated upon the completion of their labors in so successful a manner. As a whole, it is a memorable and monumental work, reflecting great credit upon American dermatology. It is, of course, a book of reference rather than a concise treatise, and the criticism that, viewed in its entirety, some of the writing is diffuse in style, does not detract in any degree from the intrinsic value of the information it contains. It must long remain a standard and valuable work. L. A. D.

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THE PRINCIPLES OF SURGERY AND SURGICAL PATHOLOGY. GENERAL RULES GOVERNING OPERATIONS AND THE APPLICATION OF DRESSINGS. By HERMAN TILLMANNS, Professor in the University of Leipzig. Translated from the third German edition by JOHN ROGERS, M.D., New York, and BENJAMIN TILTON, M.D., New York. Edited by LEWIS A. STIMSON, M.D., Professor of Surgery in the University of the City of New York, Medical Department. 8vo., pp. 800, with 441 illustrations. New York: D. Appleton & Co., 1894.

IN this translation of Tillmanns' work upon the principles of the surgical art and science we have a wide departure from the English and American type of surgical text-book. Excepting Senn's *Principles of Surgery*—a very much less complete and valuable book—we are aware of no surgery upon the modern scientific German plan that has been published in English. Yet all impartial observers must believe that the marvellous disclosures of pathology and bacteriology will compel a more and more rigid separation of the principles of surgery from the application of these generalizations to special and varying local manifestations. In Tillmanns' work we find the modern classifications and teachings of the fundamentals carried out with admirable clearness, terseness, and completeness. While nothing is included which might be

omitted excepting to the detriment of the student or practitioner, the volume nearly or quite equals in size most English text-books embracing both subjects. It is encyclopedic to a degree almost unknown within equal space.

While according to this work one of the highest places in the literature, it will be gratifying to the American surgeon to observe from its perusal the fact that in this country surgical pathology is no longer lagging so far behind our admitted lead in the practical application of the art. We find in it little that has not been laboriously added to the knowledge of the leaders of American surgery from many and varied sources, but which now has been assembled and arranged by a master mind, and, by equally masterful translation, rendered accessible in the mother tongue to all of the English-speaking race.

Extended comment is here impossible and needless. The volume as a whole is entitled to and will receive highest praise from every standpoint. Its adoption as a text-book will surely prove alike beneficial to teachers and students and serve as a worthy model upon which future American text and reference books may with advantage be based.

The translators and editors are to be warmly congratulated upon the uniform excellence and acceptability of their work. The illustrations are profuse and, generally, of high merit, especially the photo-micrographs and plates of bacteria and diseased tissues, while the mechanical and typographical features are in every way worthy of the publishing-house from which it is issued.

The volume is divided into three sections, the first of which deals with the general principles governing surgical operations, such as preparation for aseptic operations, the alleviation of pain during such procedures, prevention and arrest of hemorrhage, methods of dividing and reuniting tissues, drainage, after-treatment, amputations, resections, and repair of defects.

Section two relates to the methods of applying surgical dressings, as well as their preparation, the sick bed, immobilization apparatus, etc.

The third and most important division portrays, in a manner unknown in English surgeries, bacterial and bacterial wound diseases, infectious surgical processes, the chronic mycoses, as tuberculosis, syphilis, leprosy, and actinomycosis; injuries and diseases of bones and joints, gunshot wounds, military practice, and, finally, a chapter on tumors.

T. S. K. M.

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On Chorea and Choreiform Affections. By William Osler, M.D., Professor of Medicine, Johns Hopkins University. Pp. 121. Philadelphia: P. Blakiston, Son & Co., 1894.

Written in the usual pleasant style of the author, with the judicious mixture of the observations of others, with the results of his own large experience, this work will be one more classic for which the profession is indebted to Dr. Osler. From beginning to end the book is deeply interesting, and is exceedingly free from unnecessary technicalities, and from the needlessly complicated nosological classification so much affected by writers upon matters neurological at the present time.

The classification of the various affections more or less closely allied

to chorea is a subject that deserves, and at the author's hands receives, careful consideration. Dr. Osler has wisely omitted all study of chorea major and the so-called symptomatic choreas with the exception of the chronic progressive form. To have included these would have been to introduce into the volume questions entirely remote from chorea minor and what the author terms "choreiform affections," and would have marred the orderly arrangement and well-defined classification adopted in the volume before us.

An interesting brief review of the history of the literature of chorea introduces the subject of chorea minor. The portion of the book devoted to chorea proper is chiefly based upon the careful analytical study of 554 cases observed at the Philadelphia Infirmary for Diseases of the Nervous System.

The seasonal relations of chorea receive careful consideration, the author giving with his indorsement the views expressed in the paper upon that subject by Morris Lewis. Attention is drawn to the marked absence of imitation as an etiological factor among the cases upon which the author's conclusions are based.

The chapters dealing with the symptomatology of chorea are among the best, each symptom or group of symptoms being carefully studied. The subjects of chorea in the pregnant, in the adult, and in the aged, are treated of. Chapter IV. is occupied by a consideration of the cardiac signs and conditions encountered in chorea minor. In the 659 cases that form the basis of the monograph, 32.1 per cent. had heart murmurs during the attack. The author considers that the murmurs heard at the base or along the upper left margin of the sternum are functional in a large proportion of cases, and that they are probably accompaniments of the debility and anæmia. In regard to organic murmurs he speaks with authority, inasmuch as he has not only carefully studied the heart condition during the attack, but has examined 140 cases at an interval varying from two years to sixteen years after the appearance of chorea. Of this number, 72 presented signs of organic disease persisting after the subsidence of the attack.

The morbid anatomy of the disorder is so indefinite that but few positive statements are made save in regard to the well-known frequency of endocarditis in the fatal cases. In the section upon pathology the author first deals with the features of chorea that tend to bear out the theory of its infectious origin—its seasonal relations, its varying gravity, its frequent association with endocarditis. A consideration of the infective nature of acute rheumatism naturally follows. The conclusion at which Dr. Osler arrives is that "very probably the cause of chorea will be found to be a poison allied to, but not the same as, that of rheumatism."

In the matter of treatment nothing new is suggested. Avoidance of brain- or eye-strain at school, hygienic regulations, and maintenance of nutrition, with the combating of anæmia by iron and arsenic, are the measures recommended in the case of those who have once suffered. Rest and seclusion are urged in the treatment of the attack. Arsenic is the one drug that is recommended, but the specific action of this remedy is disposed of in the following sentences: "The general condition of the children is often much improved by this drug, but it is extremely difficult to say whether it controls in any way the choreic movements. I do not myself think that it has much influence upon them." Cotton-wool about the joints in arthritis, an ice-bag to the præcordia in

cases with endo- or pericarditis, hydrotherapy with chloral and bromides for chorea insaniens, and the induction of premature labor in severe cases occurring during pregnancy, are the other measures recommended.

The portion of the volume devoted to "choreiform affections" is of great interest. The division adopted is: (1) simple tic, (2) tic with imperative ideas, etc., (3) complex, co-ordinated forms of tic, (4) cases of noisy spasm of the respiratory muscles. The introduction of numerous personally observed cases typifying the different varieties adds much to the value of the description of them.

In the last chapter chronic progressive chorea is dealt with. The history of the literature of the affection is first given, and a valuable bibliography is introduced. In the section upon its symptomatology the author relates the history of two families so afflicted that have come under his own observation, with the records of the autopsy performed by himself upon one of the cases. The name "chronic progressive chorea" rather than "hereditary chorea" is preferred from the fact that isolated cases of precisely similar nature have occurred in families free from other examples of the disease. The results of autopsies made up to date are given, but nothing very definite is asserted as to the significance of the lesions found or as to the pathogenesis of the disease.

An appendix is furnished giving an analysis of 73 fatal cases of chorea minor. Of these, 65 presented either recent endocarditis or the lesions of a former inflammation of the endocardium. Of the eight cases in which the endocardium was reported as normal, two had pericarditis; while in several of those in which endocarditis was present there were associated lesions of other membranes or organs.

The work is one that will be read with interest and profit by both neurologist and general practitioner. F. A. P.

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PRACTICAL LECTURES IN DERMATOLOGY. By CONDICT W. CUTLER, M.S., M.D., Professor of Dermatology, University of Vermont; Physician-in-chief and Dermatologist to the New York Dispensary, etc. Pp. 233. New York: G. P. Putnam's Sons, 1894.

THE author having been requested by the students in the Medical Department of the University of Vermont to publish his Lectures on Diseases of the Skin, delivered to them during 1892–93, offers this as his excuse for the creation of another work on dermatology. The lectures were prepared from stenographic notes, the author states in the preface, and represent with substantial accuracy the lectures as they were delivered to the students.

They are practical, and are written in a somewhat colloquial style; only the commoner diseases of the skin are discussed, those which every physician should be able to diagnose and treat. From this introduction the general scope of the work will be apparent. The views expressed are in the main in accordance with those of the prominent teachers in this country. We are of the opinion that the book will prove of more interest to the student than to the practitioner. The concluding chapter comprises Dr. G. I. Jackson's "Dermatological Dont's," which have been published elsewhere. L. A. D.

# PROGRESS

OF

# MEDICAL SCIENCE.

## THERAPEUTICS.

UNDER THE CHARGE OF

REYNOLD W. WILCOX, A.M., M.D., LL.D.,

PROFESSOR OF CLINICAL MEDICINE AND THERAPEUTICS AT THE NEW YORK POST-GRADUATE MEDICAL SCHOOL AND HOSPITAL; VISITING PHYSICIAN TO ST. MARK'S HOSPITAL.

### The Treatment of Syphilis.

Dr. Vallert makes use of a 1 per cent. solution of mercury succinimide and cocaine muriate in distilled water. The amount of the drug contained in each injection is one-sixth of a grain. It is claimed that this form of mercury is generally well borne, with the addition of cocaine is not painful, and extended use has shown its superiority over other preparations of mercury when used hypodermatically.—*Therapeutische Monatshefte*, 1894, Heft 11, S. 542.

Dr. Ch. Mauriac does not believe that the iodide is an indispensable complement to mercurial medication, but that it is acceptable in case the patient shows a tendency to tertiary manifestation; still it is far from being an axiom. It is necessary to avoid establishing a tolerance, consequently it should not be continuously administered, but for periods of from four to five weeks, with intervals of rest of varying duration. The iodides should be given sometimes in early syphilis when it is ulcerative, and at the commencement of the secondary manifestations when there is an explosion of several accidents. In precocious tertiary accidents it is the remedy of excellence, and should be given in large doses. The duration of the treatment of syphilis in the majority of cases should be three years. For mercurials sublimate and the yellow iodide given alternately are preferred.—*Journal des Practiciens*, 1894, 2d Semestre, No. 36, p. 436.

### Experimental Researches in Anæsthesia.

M. L. Guinard shows from experiments upon dogs and guinea-pigs that it is dangerous to place under general anæsthesia subjects who have grave visceral lesions, who are markedly depressed, and more or less in a state of collapse. In anæsthetized patients every irritation of the intestine can be dangerous, and may reflexly cause arrest of the respiration. In grave abdominal lesions anæsthesia is dangerous, no matter what agent is employed,

but the progress of fatal accidents is more rapid with chloroform than with ether.—*Bulletin Général de la Thérapeutique*, 1894, 42d liv., p. 402.

### The Action of Trional.

M. Vogt concludes: 1. That trional is preferable to its congener, sulphonal, in that it acts more promptly and produces a calm sleep with a normal awakening. 2. The dose is a single one, taken at bedtime, of fifteen to twenty-two grains dissolved in liquid as hot as possible. If the drug, taken two evenings in succession, does not produce a slight effect, it is useless to continue it. 3. The treatment should be stopped in every case at the end of five or six days. If this is done, there is no fear of poisoning, and generally during this time the patient is relieved of his insomnia. 4. It is always a good plan to diminish the acidity of the urine in order to avoid grave accidents from the destruction of the blood-corpuscles, and this is done by the administration of alkalies. 5. The constipation which frequently follows the administration of this remedy should not be neglected, in order to avoid accumulation through lack of elimination.—*Les Nouveaux Remèdes*, 1894, No. 21, p. 489.

Dr. C. Goldman in order to prevent unpleasant symptoms presents the following rules: 1. It should never be administered in larger doses than thirty grains; generally twenty-two grains will produce a sleep of from six to eight hours; neurasthenic individuals usually need but fifteen grains. 2. It should never be administered dry or in a little cold water, but in a cup, of six or seven ounces capacity, of a warm liquid, soup or tea. This facilitates prompt absorption and rapid action. 3. The use of the drug should from time to time be interrupted—no hypnotic should be uninterruptedly administered for weeks or months. 4. In order to prevent an accumulation of the unabsorbed drug it is necessary to increase the alkalinity of the blood by mineral waters containing carbon dioxide, as seltzers, apollinaris, or the organic acids, as citric or tartaric. 5. If, in spite of this precaution, constipation becomes marked, seidlitz powder or a similar laxative should be employed.—*Therapeutische Monatshefte*, 1894, Heft 11, S. 559.

### The Toxicology of Exalgine.

Dr. George Weber reports the case of a young woman who survived the ingestion of one-half ounce of crystalline exalgine. Three-quarters of an hour elapsed before the first effects were produced; ten hours later occurred the first vomiting. Periods of coma alternated with convulsive crises, resembling the symptoms of mixed uræmia, which resemblance gave the indications for treatment. The cyanosis was successfully treated by electrization of the phrenic.—*Les Nouveaux Remèdes*, 1894, No. 22, p. 514.

### The Use of Antipyrin in Large Doses.

Dr. T. McCall Anderson has never had any personal experience with the deleterious effects, at least of a serious nature, of this drug. The initial dose should not exceed ten, or at most fifteen, grains. In the three cases reported the maximum daily amounts were seventy-five, one hundred and

fifty, and one hundred and thirty-five grains. He concludes: 1. That antipyrin is not the dangerous drug that some observers have led us to suppose. 2. It may be given with safety in large doses, even in the case of children, in most cases, although the initial dose must be small, and it must be slowly and cautiously increased, the patient always being carefully supervised. 3. In large doses it often yields surprisingly good results, and in chorea it is the only medicine from which cures may confidently be anticipated.—*British Medical Journal*, 1894, No. 1770, p. 1227.

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### Thiol.

Dr. Dillon states that this drug differs from ichthyol in that it has no disagreeable odor; the internal administration is not accompanied by disagreeable gastric disturbance; used externally it does not more than slightly stain the clothing, and even this can be removed by washing. It seems to be especially curative in the different forms of eczema, acne, herpes, erysipelas, and other inflammatory processes. In contusions and subcutaneous hemorrhages it possesses wonderful power of causing the absorption of the poured-out material. It has also been found useful in rheumatism.—*Notes on New Remedies*, 1894, No. 2, p. 21.

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### Uricedin.

Dr. Hugo Langstein concludes that this remedy: 1. In the form of cakes is not unsavory even to somewhat delicate palates. 2. Even in daily doses of one hundred and fifty grains it has no unpleasant after-results. It may, however, act as a purgative, which in cases of uric acid diathesis is not disadvantageous, but it is not unpleasant nor painful in its action. 3. Contrary to that, which cannot be said of all remedies for gout, it does not irritate the kidneys nor the heart, even after long usage. 4. It markedly increases the diuresis. 5. It is somewhat more certain, although not always more rapid, than other remedies for the elimination of uric acid. At first there is an increase of uric acid in the urine, soon it becomes less acid, neutral, or even alkaline. 6. The remedy combats and limits pain.—*Prager medicinische Wochenschrift*, 1894, No. 45, S. 571.

[For a previous notice of this drug, in which its composition is given, see this Journal, 1894, vol. cvii., No. 6, p. 714.—R. W. W.]

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### How to Use Sodium Salicylate in Acute Articular Rheumatism.

Dr. Henri Huchard believes that three principles should never be forgotten: 1. No prescription in large doses at the commencement of a polyarticular rheumatism. 2. The division of the doses. 3. The continuation of the remedy after the relief of pain. At the outset the dose should be ninety, sometimes even one hundred and twenty grains. The average dose of ninety grains should be maintained for about two days, then diminishing fifteen grains each day until sixty grains is reached. These large doses are necessary because the drug is useful the more acute and recent the disease is, and because early treatment certainly prevents cardiac complications. Divided doses are advisable because of the rapid elimination of the drug;

in this way only can the effect be made more lasting and complete. For this purpose direct fifteen grains to be taken every two or three hours. Further, it should be prescribed for at least twelve days after the pain has been relieved. It may be administered in solution or in fifteen-grain wafers, which should be dissolved in a definite quantity of liquid—an alkaline water, or a half glass of Vichy (Célestins). Because the drug is a local irritant it should never be administered in a concentrated solution. In case of pregnancy it should be administered cautiously in divided doses. The albuminuria of rheumatic origin is not a contra-indication to the use of this drug, but when it precedes the rheumatism, and especially when it is due to a renal lesion which impairs the permeability of the kidneys, it is contra-indicated, but the dangers of its use have been exaggerated.—*Journal des Practiciens*, 1894; 2d Semestre, 1894, No. 41, p. 513.

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### The Treatment of Diphtheria.

Dr. B. VanD. Hedges presents what he terms the rational treatment: (1) Thorough disinfection with hydrogen peroxide solution, rendered neutral with sodium bicarbonate. (2) Administration of freshly prepared pineapple juice, either alone or with the tincture of ferric chloride if a condition of anæmia exists. (3) Application of papoid, either by insufflation of powder or painting with strong solution. (4) Alcohol given in heroic doses. (5) Strychnine administered hypodermatically and pushed until there is an exaggeration of the deep reflexes. (6) Concentrated nutritious diet.—*New York Medical Record*, 1894, vol. xlvi. p. 682.

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### Diphtheria Antitoxin.

Drs. J. W. Washbourn, E. W. Goodall, and Mr. A. H. Card report a series of eighty cases. Of these, eight were excluded because they were not clinically, as well as bacteriologically, cases of diphtheria. Of the seventy-two cases, only sixty-one showed diphtheria bacilli, and of these thirteen died. There were nine cases upon which tracheotomy was performed, with six recoveries. Twenty of these sixty-one cases were, upon admission, suffering from the toxic effects of diphtheria, and an unfavorable prognosis was made; eight of these cases recovered. There is no evidence that the antitoxin diminishes the incidence of albuminuria. It is still too early to speak of the effect in the incidence of paralysis, but so far six cases have occurred. A rash occurred in twenty-four per cent. of the cases in from seven to nineteen days after the injection. In six cases there were joint pains which appeared about the same time as the rash, and lasted, at the most, three days, the hip being more frequently attacked. The dose is to be regulated, not by the age or weight of the patient, but by the severity of the attack.—*British Medical Journal*, 1894, No. 1773, p. 1417.

Dr. Otto Treymann reports a case of acute hemorrhagic nephritis after the use of Behring's antitoxin. The patient, a boy of three years, upon the third day of his diphtheria received the antitoxin. This treatment was repeated upon the two days following, omitted for six days, then a single injection. Upon the following day there was noticed an eruption, bad gen-

eral condition, and albumin in the urine. The next day the urine was scanty, of hemorrhagic color, coagulating on heating. Microscopical examination showed numerous red and white blood-corpuscles, a few casts, and epithelial cells. Esbach's albuminometer showed that it contained 4 per cent. of albumin. Six days after, the albumin disappeared and convalescence was established.—*Deutsche medicinische Wochenschrift*, 1894, No. 51, S. 951.

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### Blood-serum Therapy.

Dr. George E. Krieger in a seventy-page book gives an interesting *réeumé* of this subject, including the antitoxins. Taking as the text the fact established by Behring, that the blood and blood-serum of an individual which has been artificially rendered immune against a certain infectious disease may be transferred to another individual with the effect to render the latter also immune, no matter how susceptible this animal is to the disease in question, he adds the statement of Behring and Kitsato, that the immunity of rabbits and mice, when rendered immune against tetanus, is based upon the ability of the blood-serum to neutralize the toxins produced by the tetanus bacilli. Tetanus is next considered; a brief summary of the cases in which the tetanus antitoxin of Tizzoni and Cattani has been used; most of these cases are already familiar to the readers of this Journal (Department of Progress). The rules for the use of this antitoxin are as follows: 1. Since the reaction is usually proportional to the quantity of poison introduced into the organism, an early and thorough antisepsis should be observed in dressing the original wound. 2. The best means for the efficacious neutralization of tetanus germs and toxins have been found to be a strong solution of sublimate with tartaric acid, and especially the cautery. 3. The amputation of the infected part, even if the latter is of minor importance, will hardly afford any benefit, because the soluble poison is rapidly absorbed and carried into the circulation. 4. As soon as the place of infection has healed, no beneficial results can be expected from local treatment, and no time should be lost in using the antitoxin in doses to effect the best possible immunity. 5. The quantity of antitoxin to be injected is determined according to the strength of the latter, the gravity of the infection, provided there are visible symptoms, the time since the infection has occurred, and the age of the patient. The shorter the time of incubation or the more serious the latter, the larger ought to be the first dose of antitoxin. 6. The number of injections necessary to save the patient depends also on such circumstances as are just mentioned; but, as a rule, one injection should be administered every other day with a somewhat smaller quantity than was used at first, in order to maintain a sufficient immunity and so prevent a relapse, which occasionally occurs, even after the immunity has set in, and which is due to a premature elimination of the antitoxin. For diphtheria it can be said (1) every case should be treated in its incipiency locally with such antiseptics as seem fit to suppress a mixed infection. (2) The antitoxin will be of so much better effect, even in cases of mixed infection, the sooner a proper dose of antitoxin is administered. (3) The seriousness of a diphtheria infection is frequently underestimated, and for this reason it seems advisable to apply rather large than insufficient doses; for light cases two to

three hundred immunizing units, for severer ones, especially after tracheotomy, five to eight hundred units. (4) The application of the serum has to be repeated according to the gravity of the case, on the next day, or even on the same day, until a quantity of six to ten hundred or more units has been injected. (5) The administration of a serum of high potency is preferable to the corresponding amount of a weaker preparation. Used as a prophylactic, an average of one to two hundred immunizing units is sufficient to protect a healthy child against infection. As the immunity gradually decreases according to the elimination of the antitoxin, if no additional injections are given, it is evident that its duration also depends upon the quantity first administered. On the other hand, one can maintain an immunity for a longer period by repeated application of smaller doses at certain interavls.

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### The Action of Sodium Bicarbonate on the Gastric Fluids.

MM. G. Linossier and G. H. Lemoine have made a clinical study of this much-discussed subject, and formulate the following conclusions:

1. The excitation following the administration of this drug is the result of its immediate action upon the gastric fluids; the consecutive depression is connected with the general action of the drug, namely, the alkalinization of the blood.

2. In practice, for obtaining and keeping within the excitant action of the drug, it is necessary to employ moderate doses given before the meal, and continue the treatment for short periods. For the sedative action large doses during or after the meal, and for considerable periods of time, are necessary.

3. Whether a dose is large or small depends entirely upon the condition of the gastric secretion. The sensibility of the stomach to this drug is inversely as the contained hydrochloric acid.

4. The above conclusions apply also to Vichy water and probably to the other waters containing sodium bicarbonate.—*Bulletin Général de la Thérapeutique*, 1894, 46e liv., p. 492.

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### Certain Processes of Bringing on Mental Quietude.

Mr. H. C. Sen believes that there is a physiological alternate erectility of the mucous membrane covering the posterior parts of the middle and inferior turbinate bones, lasting for about an hour and a half to three hours; this being independent of any nasal disease. When the mind is free from any anxiety, and occasionally after a hearty dinner, or after a refreshing bath, both of the nasal mucous membranes become simultaneously free from any erectility, this freedom being always of short duration and concomitant with a peculiarly peaceful state of mind. Those persons who are able to insert their tongue-tip into their own naso-pharynx, find that they enjoy a peculiar pleasurable sensation, and that their power of concentration of mind remains stronger. From both of these causes the current of tidal air becomes feebler without producing any discomfort. As the current of tidal air becomes feeble the mind shows a tendency to quietude and steadiness. To prevent the mind from becoming unsteady, concentration of the mind to the different regions

of the spinal column is often advised, traversing the whole length in an up ward and downward direction with inspiration and respiration alternately. These processes for producing concentration of the mind are called by the Hindus *yogakarma*, and if practised under the direction of an expert *yogi-gurn* are marvellously beneficial.—*MS. Report*, 1894.

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### Papain.

Dr. A. Hirsch reviews the literature of this remedy and has made a very careful laboratory study. The especial method of administration is that it shall be suspended in the smallest possible quantity of water, given immediately after the meal, and repeated two or three times at from fifteen to thirty minutes, and in doses which are not too small—four, five, or seven grains. In addition careful regulation of the diet is by no means to be neglected if success is to follow the administration of the drug.—*Therapeutische Monatshefte*, 1894, Heft 2, S. 609.

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### Orexin Hydrochloride.

Dr. Ferdinand Battistini has carried out a series of experiments to determine the value of this drug. Severe toxic symptoms have not been noted; in cases where the remedy has been used for more than six weeks there is a lessening of the hæmoglobin. In artificial digestion it apparently has no effect upon peptonization. As regards the appetite—of twenty-five cases it failed in six, a slight increase in thirteen, and a marked improvement in six. The results are apparently not very encouraging for the remedy, although some failures may have arisen from the use of the remedy in pill-form.—*Therapeutische Monatshefte*, 1894, Heft 12, S. 614.

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### Rhus Toxicodendron.

Dr. H. M. Whelpley, recognizing toxicodendric acid as the active medicinal and poisonous principle of the plant, has ascertained that handling of the dried and compressed plant will produce the well-known eruption, although its poisonous action may be impaired by drying. The drug has been recommended as useful in a large number of morbid conditions, from nocturnal incontinence of urine to pemphigus. Among the antidotes to its poisonous action may be cited: solution of chlorinated lime, cold lead-water, sodium hyposulphite, saturated tincture of lobelia, hamamelis, bismuth subnitrate, phenol, linseed oil, strong coffee, and potassium permanganate.—*Bulletin of Pharmacy*, 1894, No. 12, p. 552.

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### Ethyl Bromide.

Dr. Charles Greene Cumston states that this drug is fit for administration only when it is (1) extremely volatile, (2) colorless, (3) and of a sweet and ethereal odor. The dose varies from three drachms (child of two years) to six drachms (adult). Food, even a glass of milk, is absolutely forbidden upon the day of operation. The mask should perfectly cover the mouth and nose, so that no air is allowed to enter. The entire dose should be given at

once. Sleep is obtained in twenty to thirty seconds, and lasts from two to three minutes, sometimes longer. When narcosis is complete the mask should be removed, and under no consideration reapplied. After an experience of two hundred cases the following rules are given: (1) Ethyl bromide should be carefully distinguished from ethylene bromide. (2) A pure and, if possible, a freshly prepared drug should be used. (3) Administer the drug *en masse*, since some patients have died from small and continued doses. (4) Do not prolong the administration over one minute. (5) When once the mask is removed and the operation begun, do not apply it again. (6) The contraindications are dangerous lesion of the heart, lungs, and kidneys.—*Boston Medical and Surgical Journal*, 1894, vol. cxxxi. p. 613.

## MEDICINE.

UNDER THE CHARGE OF

GEORGE DOCK, M.D.,
PROFESSOR OF MEDICINE IN THE UNIVERSITY OF MICHIGAN;

AND

AUGUSTUS A. ESHNER, M.D.,
ADJUNCT PROFESSOR OF CLINICAL MEDICINE IN THE PHILADELPHIA POLYCLINIC.

### Pancreatic Hemorrhage, Pancreatic Necrosis, and Fat-Necrosis.

Caspersohn (*Centralblatt für Chirurgie*, 1894, No. 47, p. 1163) has reported the case of a corpulent woman, thirty-six years old, who was seized with vomiting and intense pain in the epigastrium. After rest in bed for two weeks and suitable internal medication, improvement set in and continued for ten or eleven weeks. At the end of this time both the vomiting and the pain were renewed. There was marked elevation of temperature, slight distention of the abdomen, with general tenderness, particularly in the epigastrium. The urine was diminished in amount, but contained no albumin. In the course of a week the vomiting and the tenderness subsided, and the amount of urine returned to normal. The improvement continued for twelve days, when the previous symptoms returned. A sense of resistance was now easily distinguished in the left hypochondrium. The condition of the patient became so alarming that exploratory cœliotomy was undertaken. A vertical incision was made in the mammillary line over the seat of resistance, and after division of a heavy layer of fat a tumor-like mass resembling a neoplasm adherent to the peritoneum was exposed. This proved to be degenerated and cicatrized fatty tissue. In places small fragments of coagulated blood were visible. Upon extending the abdominal incision a considerable quantity of brownish fluid escaped. An incision into the mass within the abdomen failed to disclose a focus of inflammation.

The pulse had by this time become so poor that the operation had to be prematurely terminated. The wound was partially sutured and partially tamponed with iodoform-gauze. The patient failed to react, and death ensued from heart-failure. Upon post-mortem examination cicatrized and adherent masses of fat were found everywhere in the mesenteric structures. Behind the liver and adherent to its inferior surface was a large cyst containing clear, odorless fluid of dark, coffee-brown color. The liver, stomach, and adjacent parts were removed, and further examination showed total necrosis and partial sequestration of the pancreas and remains of hemorrhage into the pancreas; sacculated chronic peritonitis of the gastro-hepatic omentum, together with an exudate containing hematin; and increase and disseminated necrosis of the fatty tissue.

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### Ulnar Paralysis Following Typhoid Fever.

Wolf (*Wiener medicinische Presse*, 1894, Nos. 46 and 47) has reported the case of a boy, ten years old, who, several months after recovery from a severe attack of typhoid fever, attended with slight intestinal hemorrhage, was noticed to use his right hand awkwardly, and avoid its use when possible. The patient was quite unconscious of his peculiarity, and had suffered neither pain nor abnormal sensation in the right hand and forearm. On examination there were found palsy and atrophy in the distribution of the right ulnar nerve. The first phalanges of the fourth and fifth fingers were in a position of extension, while the second and third phalanges of the same fingers were flexed. The function of the interossei was in abeyance, and the patient was unable to separate or approximate the fingers. The muscles of the hypothenar eminence and of the first interosseous space were flabby and wasted, and the abductor pollicis brevis was notably atrophied. The thumb was abducted. The electric irritability of the ulnar nerve was quantitatively diminished to both forms of current. The muscles yielded the reaction of regeneration. Sensibility appeared slightly diminished to the faradic current.

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### On the Value of the Commonest Tests for Glucose in Urine.

A. Jolles (*Centralblatt für innere Medicine*, 1894, Nos. 44 and 45) gives an exhaustive report on the results of a large series of experiments with different tests for sugar in urine. For details regarding various tests the original must be consulted. Among the author's conclusions the following are noteworthy: Glucose is not a constituent of normal urine, and can only be found there when large quantities are used, and then only in traces. For the recognition of the proportion of sugar in urine it is necessary to use a sample taken from the excretion of twenty-four hours. The specific gravity of normal urine is higher than hitherto supposed, *i. e.*, 1018 to 1022. The presence of sugar cannot be concluded from a high specific gravity. Small proportions of sugar do not influence specific gravity appreciably. Trommer's test and that of Worm-Müller indicate quantities of sugar as small as 0.08 per cent., but as much as 0.24 per cent. may be simulated by other substances. Next to uric acid and creatinin, the coloring-matters of urine and of bile

are the most important reducing agents which simulate the sugar test. Diabetic urines which have stood for some time sometimes undergo decomposition of urea, with the production of ammonia in amounts which impair the accuracy of the reduction tests. Nylander's test, which is accurate for quantities of more than 0.3 per cent. of sugar, can only be applied in non-albuminous urine. Albumin if present must be coagulated by boiling, and not precipitated, as in the latter case some of the sugar is carried down. In using the polariscope it must be remembered that not only certain urinary salts, but also some drugs excreted by the kidneys (*e. g.*, benzosol) may impair the result. In using the fermentation test the yeast must be free from starch; the temperature need not be elevated. The sensibility of this test is about 0.1 per cent. The phenylhydracin test is one of the most certain. The crystals of glycuronic acid, which occur frequently, can be distinguished under the microscope from those of phenylglucosazon by their relative shortness and thickness and their tendency to form rosettes rather than clusters. The sensibility of the test is about 0.03 per cent.; less in urine containing large amounts of urates or albumin, and in concentrated urine. The test-tube containing the urine and reagents should be boiled in a water bath for one hour, and then allowed to cool slowly and for a long time (twelve to fourteen hours).

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### Peri-articular Abscess due to the Typhoid Bacillus.

Swiezynsky (*Centralblatt für Bacteriologie und Parasitenkunde*, Band xvi., No. 19, p. 775) has reported the case of a man, eighteen years old, with the following sequence of an attack of typhoid fever of considerable severity: swelling and pain appeared in the right arm, followed by redness, tenderness, and fluctuation about the shoulder-joint, although this itself was not involved. In the course of a little while an abscess formed beneath the right deltoid, and an incision evacuated a quantity of pus mixed with blood. The wound healed without complication, but three days later symptoms of occlusion of the left femoral vein appeared; nevertheless, recovery eventually ensued. Bacteriologic investigation of the pus evacuated from the abscess about the joint disclosed the presence of typhoid bacilli exclusively.

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### The Relation of the Pancreas to Diabetes.

Hansemann (*Zeitschrift für innere Medicin*, Bd. xxvi. Heft 3 u. 4) has made a valuable statistical investigation on this subject, which has shown itself so difficult of solution. The remarkable investigations of Minkowski and von Mering in the production of diabetes by extirpation of the pancreas in dogs did little to clear up the discordant results of examinations of cases of diabetes in man, and the fact that in some animals removal of the pancreas is not followed by diabetes left the matter in much the same position it occupied before. Yet of the relations in dogs there could be no doubt, so that an examination of a large number of cases like those accessible to Hansemann could hardly fail to be profitable.

To functions like that which, on the part of the dog's pancreas, control diabetes, Hansemann had previously applied the term "positive," as contrasted

with "negative" functions like that of the kidneys in the secretion of urine, of the liver in the secretion of bile, etc. This term seems preferable to "internal secretion," which we have taken from the French.

In analyzing his material Hansemann made three groups of cases: 1. Diabetes without alteration of the pancreas; 2. Pancreatic disease without diabetes; 3. Pancreatic disease with diabetes.

As regards the first group, the author found cases, as had others, of diabetes in which the most minute examination failed to show alterations in the pancreas.

In regard to the second group, one must remember that, according to Minkowski, the severity of experimental diabetes in cases of partial removal of the pancreas bears no relation to the amount of the gland remaining, nor to the intensity of the evident anatomical change in that part. From this it can be understood that most cases of cancer of the pancreas and of cysts do not come under consideration. Cloudy swelling and fatty degeneration are not supposed to lead to diabetes because of the slight loss of function these changes involve. Cases of acute necrosis of the pancreas might be supposed to lead to diabetes. But out of one hundred cases collected by Fitz and Seitz only two had diabetes. Another case was observed by Frerichs. In most of these cases, however, the course of the disease was so short that it may easily be supposed there was no time for the development of diabetes (which does not occur at once after extirpation in dogs). In the cases of longer duration it may be doubted whether the whole gland was destroyed. Another disease which might be supposed to lead readily to diabetes is diffuse cancer of the pancreas. Two such cases were observed by Hansemann without diabetes. This the author explains by the ingenious supposition that the cells of the new growth continue the positive function of the cells from which they are derived.

Calculus with atrophy has been observed in combination with diabetes in some cases, but in others diabetes was not present. The author reports two more cases of this kind, without diabetes. In these cases, however, the glands were partly unaffected.

From the records of the Berlin Pathological Institute and the Augusta Hospital Hansemann was able to discover that the cases with the coincidence of disease of the pancreas and diabetes occurred more frequently than diabetes alone, or pancreatic disease alone, and in fact oftener than these two combined.

The commonest disease of the pancreas found in diabetes, according to the author, is an atrophy which differs both to the naked eye and microscopically from atrophy as the result of diabetes or of cachexias. Hansemann compares it with certain forms of contracted kidney. It earliest anatomical signs are similar to those described by Lepine as periacinose sclerosis. This atrophy rarely leads to complete destruction of the pancreas. The process is not identical with fibroid induration of the pancreas, which results from acquired and congenital syphilis, and which is sometimes observed in diabetics.

As the result of his examination Hansemann formulates the following conclusions: There is nothing known which opposes the application of the results of experiments in canine pancreatic diabetes to man. The total

destruction of the pancreas in man may be assumed to cause diabetes. If the pancreas is partly destroyed, diabetes may not appear. The destruction of the pancreas does not produce any special form of diabetes, nor has it any relation with age or sex. The alterations in the pancreas in diabetes are very manifold. Acute inflammation, necrosis, occlusion of the duct, atrophy from pressure, cysts, and spontaneous atrophy occur with or without diabetes. The only exception to this is the genuine atrophy (or the granular atrophy of Hansemann). This belongs to the chronic interstitial inflammations, and seems to lead essentially to a lessening of the positive function of the pancreas. The precise histological change which is connected with this diminution of function Hansemann does not attempt to state. Nothing can be recognized but a diminution in size, and at times slight fatty degeneration of the parenchyma cells. Just as the genuine contracted kidney gives characteristic symptoms, so the granular atrophy of the pancreas leads necessarily to diabetes, whereas the other diseases only cause diabetes when sufficiently extensive.

Hansemann, in the same article, describes briefly but clearly a condition of the kidneys characteristic of diabetes. The organs are enlarged, the surface smooth. The cortex is pale red, sometimes yellowish. The glomeruli are plainly visible as red points. The medulla is somewhat cyanotic. Microscopically, the tubules of the cortex show cloudy swelling, at times an extensive and uniform fatty degeneration of the epithelium of all parts of the tubules. This may be found in cases presenting only slight albuminuria during life. The nuclei stain well. The bloodvessels, especially the glomeruli, are distended. Interstitial proliferation is not present. The whole process appears as a consequence of the excessive excretion of a slightly irritating substance, an hypertrophy from overwork. This process, of course, does not exclude the possibility of other alterations.

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### The Importance of the Liver in Pancreatic Diabetes.

Marcuse (*Zeitschrift. für klin. Medicin*, Bd. 26, Heft 3 u. 4) has removed the liver immediately after extirpation of the pancreas, in frogs. Most of the animals lived more than two days, within which period the author found that glycosuria occurred after removal of the pancreas alone. In none of them did glycosuria follow. The explanation of this, Marcuse thinks, is not that the liver is the place of formation of the diabetic sugar, but that either a substance, so far unknown, appears which is normally used in the liver, and which paralyzes pancreas diabetes, or else that normally a sugar-forming substance is formed in the liver and distributed to the blood and tissues, which indirectly causes diabetes. As the author remarks, the observation is not of much value in itself, but it opens up a number of new points of view of great interest.

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### Levulose in Diabetes.

W. Hale White and R. Grube report (*Zeitschrift für innere Medicin*, Bd. 26, Heft 3 u. 4) two series of experiments, carried out independently, on the use of levulose in diabetes. White's eight cases (seven patients, one treated twice) were, with one exception, severe; the seven cases of Grube,

with one exception, mild. Both observers reach similar conclusions to those of Leyden and Minkowski, that levulose can be taken by diabetics without bad results, and that in the bodies of such patients fruit sugar can be used even when cane sugar and glucose cause excessive excretion. The account of White's experiments is to be published in full in the fiftieth volume of *Guy's Hospital Reports*.

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### Sudden Death from Rupture of the Stomach into the Left Thoracic Cavity.

Czernicki (*Archives de Médecine et de Pharmacie Militaires*, 1894, No. 11, p. 395) has reported the case of a man who came under observation on account of intense abdominal and thoracic pain, with vomiting and attacks of syncope. After a time the pain subsided and the vomiting ceased, but the patient continued to present an anxious appearance, and the pulse was frequent, compressible, and feeble. The heart was markedly displaced to the right, its impulse feeble, and its sounds faint. The left thoracic cavity presented anomalous areas of dulness and resonance on percussion, with abnormal auscultatory phenomena. The patient slept for a short time, and was observed subsequently to speak to his neighbor, but somewhat later he was found dead. Upon post-mortem examination the left pleural cavity was found occupied by the greatly distended stomach, which had gained entrance through a rent in the diaphragm and had compressed the left lung. The margins of the opening in the diaphragm appeared in process of cicatrization. The stomach presented a triangular perforation on the greater curvature, surrounded by an area of inflammation. From information subsequently gained, it is believed that the rupture of the diaphragm had taken place some time before the patient came under observation, in the course of wrestling with a comrade. There had been previous paroxysmal attacks of pain that were ascribed to intestinal colic.

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### Mercurial Pseudotabes.

Gilbert (*Deutsche medicinische Wochenschrift*, 1894, No. 44, p. 842) has reported the case of a man, twenty-six years old, who had been infected with syphilis and had been actively treated. He presented severe pains in the lower extremities, and subsequently complete palsy and muscular atrophy. There was reaction of degeneration and the tendor-reflexes were wanting, but there were no ataxic symptoms. The case was considered one of paralytic polyneuritis of syphilitic origin, aggravated by abuse of alcohol and tobacco. Treatment with mercurial inunctions, and subsequently, as the pain subsided, with massage and potassium iodide, was followed by notable improvement, so that the patient became able to walk about with the aid of sticks. Ataxia had now developed, and was augmented when the eyes were closed. Sensibility was impaired upon the lower extremities, below the upper third of the leg, and particularly upon the right side. The function of the bladder was deranged. The patient complained of burning pains following the course of the nerve-trunks of the upper and lower extremities. There were numbness in the feet, and a sense of weakness and uncertainty in walking. Improvement followed the use of a roborant, bland diet, with a course of baths, massage,

and electricity. The patellar tendon-reflexes returned, and the patient had comparatively recovered; he, however, indulged in alcoholic excess, which was followed by anasarca, and led to a fatal termination. It is believed that the symptoms were largely due to multiple neuritis dependent upon mercurial intoxication.

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## SURGERY.

UNDER THE CHARGE OF

J. WILLIAM WHITE, M.D.,

PROFESSOR OF CLINICAL SURGERY IN THE UNIVERSITY OF PENNSYLVANIA; SURGEON TO THE UNIVERSITY AND GERMAN HOSPITALS;

ASSISTED BY

ALFRED C. WOOD, M.D., INSTRUCTOR IN CLINICAL SURGERY, UNIVERSITY OF PENNSYLVANIA; ASSISTANT SURGEON, UNIVERSITY HOSPITAL.

AND

C. L. LEONARD, M.D., ASSISTANT INSTRUCTOR IN CLINICAL SURGERY IN THE UNIVERSITY OF PENNSYLVANIA.

### THE SURGERY OF THE SPINAL CORD AND ITS APPENDAGES.

WILLIAM THORBURN reviewed the present position and future prospects of the surgery of the spinal cord and its appendages in two lectures recently delivered before the Royal College of Surgeons of England (*British Medical Journal*, 1894, Nos. 1747 and 1748). The term "laminectomy," it is pointed out, is of quite recent creation, but is adopted throughout as more suitable than the older terms, "trephining the spine," "vertebral resection," "rachiotomy," etc. "Lamnectomy" is preferable, but has not been generally accepted. The author says, "The dangers of the operation are not great, especially in view of the conditions which it is intended to relieve."

*Mortality.* Of seventy cases of tuberculous affections for which laminectomy was performed by distinguished surgeons, in twelve instances death is said to have been due to or hastened by the operation—a mortality of 17.1 per cent. The death was in most cases attributed to shock. Sepsis has been practically absent, and hemorrhage has rarely been serious.

*Penetrating wounds of the cord.* Of forty published cases of stab-wounds, in thirty-eight of which the result is stated, but fifteen died—in nine instances from septic infection. In twenty-one non-fatal cases of wounds of the cord, all under the most favorable circumstances, but three fully recovered; sixteen had persistent paralysis or anæsthesia, or both, and two more were said to be improving when lost sight of. This justifies the general conclusion that in man we cannot hope for anatomical recovery after a lesion of the spinal cord. The case is different with the nerve-roots, however, after they have left the cord. In the event of injury these may be sutured with every prospect of restoration of function.

*Fractures and dislocations.* In compound fractures (usually gunshot wounds) there can be no doubt of the advisability of removing all splinters and foreign bodies. Of the fractures of the spine, those of the laminæ are

the most important. From the analysis of ten published cases, the author arrives at the following conclusions: 1. The cause of this injury has generally been stated to be direct violence to the spine, but in four of my ten cases there was certainly no direct violence, and in only three is such distinctly described. Further, the frequency of this injury in conjunction with a fracture of the bodies indicates a similarity in the mechanism of their production. 2. The symptoms of fracture of the laminæ are by no means definite, and the only case, in which we can be satisfied that the diagnosis was made before death, owed its detection to the distinct lateral mobility of a spinous process. 3. The diagnosis is therefore difficult, and probably we can rely only on the following points: *a*. The cause, if there be a clear history of direct violence; *b*. The normal contour of the spine and the presence of lateral mobility of one or more of the spinous processes in conjunction with an obvious lesion of the spinal cord.

In these cases laminectomy is clearly indicated, if there be any symptoms of pressure on the cord.

Fractures of the bodies of the vertebræ and dislocations are considered together. The displacement in dislocation is said to be forward and downward; any other form may be regarded as a pathological curiosity.

*Nature of injury to the cord.* Such being the main varieties of injury to the spine, we may now ask ourselves what are the various methods in which the cord itself suffers, and we find these to be as follows:

1. By far most commonly there is approximation of the laminæ of the vertebræ above to the body of that below, causing crushing of the cord. Such crushing may be associated on the one hand with permanent pressure, as in true dislocation and in fractures which do not recoil; or, on the other, with temporary compression, as in diastases and in fractures which do recoil.

2. A fragment of bone may be driven back upon the spinal cord, but such a condition is exceedingly rare.

3. Equally rare, if not more so, is a condition presented in these two specimens, in which an intervertebral disk is, as it were, squeezed out from between the adjacent bones, so as to form a projecting shelf which compresses the theca.

4. And, lastly, the medullary symptoms may be mainly due to the pressure of hemorrhage.

The diagnosis of these different lesions is as yet impracticable. The condition known as gravitating hemorrhage is easily recognized. It is met with in cases in which some of the spinal bloodvessels are injured, and as the blood escapes it gravitates to the lowest portion of the spinal canal, causing paralysis by pressure. The paralysis rapidly extends upward as the collection of blood rises in the canal. The author would be inclined to perform laminectomy at the seat of injury and attempt to arrest all visible bleeding points, and give exit to the blood that could not be arrested. This procedure may be combined with paracentesis of the meninges in the lumbar region after Quincke's method, or, if this was not satisfactory, a secondary laminectomy at the lower part of the spine.

Practically there are three varieties of injury of the cord which call for treatment, namely, permanent pressure upon the cord, temporary compression of the cord, and hemorrhage. The latter is rare and difficult to diagnosticate. In the

first condition it is possible to restore the normal lumen of the canal, but it is doubtful if any benefit will result, as the injured cord is not capable of regeneration. In the cases of temporary pressure, which constitute the majority, nothing could, of course, be obtained by operation. The author expresses the opinion that we are not yet able to treat with success the common injuries of the spinal cord. The author summarizes his conclusions as follows: In compound fractures, operate. In fractures of the spinous processes and laminæ, with injury to the cord, we also operate. In simple fractures and dislocations of the bodies of the vertebræ, if there is a reasonable probability that the injury is due to hemorrhage, operation is advisable; but in all other cases of this nature we cannot hope to do good save where the injury is below the level of the first lumbar vertebræ. In such cases, however, laminectomy is an eminently valuable surgical procedure.

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### The Etiology of Cancer, with Especial Regard to the Protozoan Parasites of Cancer.

Smith (*New York Medical Journal*, January 5, 1895) after a careful historical study of this subject and its literature, describes the methods which he used and the results of his research, and says:

"Whatever else has been said, however, in relation to the subject, these two factors stand out in bold relief, and these may be offered as the writer's conclusions: (1) Cancer presents a course and clinical aspect analogous to those of formations of parasitic origin. (2) Within cancerous tissues occur bodies which closely resemble the different life-stages of protozoa, of sporozoa, of gregarinidæ."

That further study is necessary goes without saying, and that that study may be of the greatest value it should be of most extended character, both as to the methods of study and the tissues studied. New methods of staining, efforts at differentiation under all conditions of previous preparation of the tumors, the examination of tumors from all parts of the body and from individuals all over the world, the examination of tumors other than the strictly cancerous and of normal structures; all this is demanded, as well as the pursuit of the great desideratum, a culture method for the purpose of the growth and isolation of the protozoan parasites, if the subject is to be conclusively decided.

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### The Extirpation of Tuberculous Pelvic Lymphatic Glands.

Sprengel (*Centralbl. für Chirurg.*, 1894, No. 46) describes two successful extirpations of these glands. The steps of the operation are: 1. Incision over and removal of infected glands in the groin with exposure of the femoral vessels to Poupart's ligament. 2. The incision of all the ligaments down to these vessels in order to have them fully in view during the operation, and thus prevent accidental wounding. 3. Transverse incision along Poupart's ligament and freeing of the pelvic peritoneum. 4. Elevation of the pelvis. 5. Drawing back of the peritoneum so that the large vessels and all the gland are exposed. 6. Extirpation of the glands to the bifurcation of the common iliac. 7. Closure of the wounds by partial suturing and tampons.

The indications for operation are those common to tuberculous gland infections in other parts of the body.

The contra indications are: General tuberculosis, simultaneous disease of vital internal viscera; in cases where the infection has extended so far as to make removal of the centrally located glands impossible.

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THE DIAGNOSIS AND SURGICAL TREATMENT OF CASES OF EMBOLISM AND THROMBOSIS OF THE MESENTERIC BLOODVESSELS, WITH REPORT OF CASES.

Under this heading, WATSON (*Boston Medical and Surgical Journal*, December 6, 1894) reports the following case. A woman, fifty years of age, had a history of dyspnœa and palpitation extending over several years. One week previous to admission she was seized with violent general colicky pains in the abdomen. This pain persisted intermittently for five days, and then became localized in the right iliac fossa, and diminished in severity. There had been no passage of flatus or feces since the beginning of the attack. Vomiting began two days before entrance, and persisted. There had been gradually increasing abdominal distention from the first. On admission the patient was conscious, face and extremities cold, cyanotic, and covered with cold sweat. The abdomen was greatly distended and universally tympanitic. The pulse was weak, thready, and irregular. Temperature subnormal. The operation showed a large amount of dark bloody serum free in the peritoneal cavity. The ascending colon was adherent to the parietal peritoneum, distended and deeply congested, and in places beneath its serous surface there were hemorrhagic extravasations from a point two inches above the cæcum to its juncture with the transverse colon. Scattered over this area were about a dozen spots of beginning gangrene, varying in size from a quarter dollar to a ten-cent piece. No occlusion was found. In the mesentery of this portion were felt a large number of apparent thrombi of the superior mesenteric artery or vein. The line of demarcation was well defined, but the patient's condition did not warrant resection. An artificial anus was, therefore, made. The patient died five days later. No autopsy was obtained.

With regard to diagnosis the author says there are certain symptoms which, when associated, are fairly, though not positively characteristic. He gives their order as follows: "(1) Colicky, very intense, not definitely localized, abdominal pain. (2) Bloody diarrhœa. (3) Subnormal temperature. Vomiting, if present (and next to pain it is the most frequent symptom), strengthens the diagnosis, as do also abdominal distention and marked prostration; but the first two or first three symptoms, when occurring in combination, are the only ones that can be called in any sense characteristic. Pain is the first symptom more often than any other, and its intense character is dwelt on by several authors."

In regard to operation the author says it may be concluded that laparotomy is indicated in all cases in which the symptoms suggest the nature of the disease, and in which the patient is not too greatly prostrated or has not some other fatal disease. There will probably occur a few in which the local and general condition is favorable to success. Resection with immediate suture is recommended where possible.

ELLIOT (*Annals of Surgery*, January, 1895) reports a case in which he removed four feet of intestine for infarction, probably due to thrombosis of the superior mesenteric veins, and in which complete recovery followed. The patient was a man twenty-five years of age, who had had a right inguinal hernia for four years, for which he had worn a truss at times. Ten months before, the hernia had been caught in the ring, and was returned with considerable difficulty and great pain. Sudden exertion since then has caused pain, but the hernia never returned. He had had pain in the right lower abdomen for two weeks. He felt a slight increase of pain while playing ball, went home and vomited, slept well all night, and ate breakfast as usual. His bowels moved, he felt well, and went to work. An hour later he felt pain in the right inguinal region while carrying a box, he went home and vomited. The pain increased and was relieved by a dose of morphine before he entered the hospital. On entrance his general condition was good; pulse, 56; temperature, 99.8° F. He was well nourished, but pale. He complained of constant severe pain over the whole of the lower abdomen, with acute exacerbations. An elongated bunch was felt over the appendix region. There was no distention or tympanites, and the inguinal ring was empty. He hiccoughed throughout the night, but had no nausea or vomiting. The pain continued paroxysmal, with intervals of almost entire comfort, although morphine had been withheld; the patient slept but little. He became rapidly worse, and when the operation was begun, at 11 o'clock, about twenty-four hours after the first severe pain, the patient was in poor condition. The operation disclosed a very dark gangrenous-looking small intestine with a free inguinal ring without inflammation. There was no evidence of hernia or any other constriction or twist, and the intestine was neither dilated nor contracted at any point. The unhealthy portion was deep red, and nearly black, having a slight gangrenous odor. Its walls were thickened by the presence of dark blood in the tissues. The peritoneal coat was without lustre, and so friable that it was easily torn by handling. It was separated from the healthy part by a widely diffuse shading at both ends. It was evidently a hemorrhagic infarction almost gangrenous. There were enlarged glands in the mesentery, and the mesenteric vessels felt thick and seemed to be plugged. Forty-eight inches of intestine were resected, and an artificial anus made, which was closed later, the patient making a complete recovery. The diagnosis of hemorrhagic infarction was confirmed by a careful pathological examination and analysis.

The second case reported was in a man nearly seventy, with atheromatous arteries, who had been previously paralyzed in both legs, but from which he had recently recovered. Three days before admission he had paroxysms of pain in the epigastrium; this became more intense; the abdomen was distended, and the transverse colon could be distinguished. The case was supposed to be an obstruction of the intestine (probably cancerous) in the descending colon. The operation disclosed a thrombosis of the mesenteric artery. The intestine was very friable, and an artificial anus was made. The patient died a week later. The autopsy showed the gangrenous part of the intestine had been caused by thrombosis of a branch of the mesenteric artery. The author believes immediate suture of the cut ends is the best method; but the doubtful condition of the gut and strength of the patient must be considered.

In conclusion he remarks: As occlusion of the mesenteric vessels is usually associated with heart disease or atheromatous arteries or cirrhosis of the liver, we must not expect much from operative treatment. Nevertheless, patients with symptoms of intestinal obstruction cannot be left unrelieved. Possibly more cases will appear with purely local lesions. They may offer a chance for an occasional surgical success.

## OPHTHALMOLOGY.

UNDER THE CHARGE OF

GEORGE A. BERRY, M.B., F.R.C.S. EDIN.,
OPHTHALMIC SURGEON, EDINBURGH ROYAL INFIRMARY;

AND

EDWARD JACKSON, A.M., M.D.,
PROFESSOR OF DISEASES OF THE EYE IN THE PHILADELPHIA POLYCLINIC; SURGEON TO WILLS EYE HOSPITAL, ETC.

### CATARACT EXTRACTION IN PERSONS OVER EIGHTY YEARS OF AGE.

HIGGENS (London), in a series of nine hundred and twenty-five cataract extractions, reports (*Lancet*, No. 3702) nineteen cases in which the patient was eighty years of age or upward. In all but two the results were entirely successful, in one partially successful, and one eye was lost with loss of the fellow eye by sympathetic ophthalmia. The operation usually employed was a small flap upward with iridectomy. In three, however, the flap was made downward, and in three no iridectomy was done.

Higgens finds that with cocaine there is less need to make any preliminary iridectomy, since there is with it no such necessity to hasten the operation as when the patient is under the influence of a general anæsthetic.

### FILARIA LOA BENEATH THE CONJUNCTIVA.

At a recent meeting of the Ophthalmological Society of the United Kingdom, ARGYLL ROBERTSON (*Ophthalmic Review*, No. 156, p. 329) reported the case of a woman, thirty-two years old, who had resided in Old Calabar, on the west coast of Africa, for a number of years, but had been obliged to return home on account of intermittent fever and dysentery. Eight months before coming under observation the woman felt a filaria loa in one eye. The worm caused a sensation of pricking or quivering, and its movements were clearly recognizable. It wandered over the eye beneath the conjunctiva, which it raised into a small ridge as it moved; it sometimes left one eye, and could be felt to cross the bridge of the nose beneath the skin and find its way into the other eye; of late it had confined itself to the left eye. Sometimes the eye

was tender and a little suffused after the appearance of the parasite. In the warm climate of Africa the worm made its appearance frequently, but on the woman's return to England it was only visible in warm weather, disappearing into the deeper parts on exposure to cold. When the parasite was visible the eye appeared normal, except for a small vesicle at the outer part of the conjunctival cul-de-sac, and tortuous movements could, under favorable conditions, be seen beneath the conjunctiva. The worm was kept in place with a finger, while the eye was cocainized. Then an incision was made in the conjunctiva and the parasite withdrawn. It looked much like a piece of fishing-gut, and was active for a short time, but it soon succumbed when placed in a weak solution of boric acid. It was 25 mm. long and 0.5 mm. thick; its head tapered slightly and its tail to a greater degree. Around the worm was wrapped a fine filament that appeared to be its alimentary canal. From the size of the animal it appeared to be a male. It was not known how it had gained entrance. No filaria were found in the blood.

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### Some Phases of Opacity and Luxations of the Crystalline Lens.

Thompson (*Ophthalmic Review*, No. 156, p. 313) contends that segmental opacities of the lower inner portions of the crystalline lens usually remain stationary for years, and rarely cause blindness. Annular opacity, or "arcus senilis lentis," is often encountered in persons under thirty years of age. Women seem to be more subject to it than men; it rarely passes beyond the periphery until after middle life, when it sometimes extends in the form of a minute speckled opacity of the whole anterior surface of the lens, again to become stationary, and seldom causing blindness. Cataract is occasionally cured spontaneously by liquid degeneration within the capsule. Congenital ectopia lentis is by no means a harmless anomaly. Its subjects are usually highly myopic, and have greatly reduced acuity of vision. It may cause loss of vision by glaucoma, and ultimately destroy sight by luxation of the lens downward, thereby inciting inflammatory reaction. Spontaneous luxation downward of the cataractous lens of an elderly person often takes place. It gives temporary sight to the patient, but the end is usually suffering and loss of vision. "Second sight" is a danger signal. It is not always caused by an increase in the conjugate axis of the lens incident to incipient cataract. It is frequently present long before the faintest sign or symptom of cataract. It is often brought on by long-continued congestion of the fundus, as indicated by numerous minute floating particles in the vitreous humor, by a relaxed suspensory ligament, and by luxation of the lens forward.

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### Low Degrees of Eye-strain a Source of Systemic Disturbance.

As the result of a systematic examination during a period of eight years of the eyes of all patients complaining of headache, giddiness, or of other symptoms that could possibly be induced as a reflex to an over-exercised ciliary region, Lowe (*British Medical Journal*, No. 1768, p. 1107) has found that low degrees of astigmatism are far more potent in producing such phenomena than the high degrees; although the reverse was observed in cases of hypermetropia. The explanation offered is that when mild astigmatism

exists perfect vision can be obtained by an effort of focus, and the ciliary apparatus persists in this effort so long as its object can be accomplished. When the degree of astigmatism is, however, more pronounced, no effort of accommodation can bring about clear vision, and the ciliary apparatus gives up the attempt in despair. It is not then the astigmatism that produces reflex disturbances, but the effort to overcome it. It is further pointed out that the effect of peripheral irritation must depend not only upon the degree of such irritation, but also upon the excitability of the brain and the reflex centres. Reference is made to two cases in which the ciliary region was proved to be an epileptogenous zone, both patients completely recovering on the adoption of suitable lenses.

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### An Outbreak of Ophthalmia in a Boarding-school.

Snell (*British Medical Journal*, No. 1768, p. 1104) reports an epidemic of ophthalmia in a boarding-school containing 84 boys, of whom 38 were regarded as healthy, while in 39 the eyes, though not in many cases presenting any marked departure from the normal, were under the circumstances not considered quite well, and in 7 the diseased condition was marked. The vesicles were seated chiefly upon the inner surface (which was also reddened) of the lower eyelid, in some cases running the greater part of the length of the lid like a chain of pearls. In but few cases was the retrotarsal fold involved. The upper lids were less affected; when they were, they had lost their polish and appeared often velvety, or, in some instances, as if the finest sand had been sprinkled on the surface; there was also in some cases an increased vascularity. There appeared in all an absence of perceptibie discharge. No discomfort was complained of, and, without everting the lids, hardly a case presented any abnormality. The outbreak was preceded by the prevalence of influenza, with which many of the boys had been affected, and ophthalmia had existed in the city and in a girls' boarding-school with which there had been communication through relatives. It is believed that the early cases may have been mild instances of ordinary catarrhal ophthalmia followed by the development of vesicular conjunctivitis, or the early instances may not have been imported, but have been merely an evidence of the prevalence of the disorder, the more marked cases at that time attracting attention. At the time of and previous to the outbreak the drains were open in close proximity to the school-house, the city authorities having the streets up for the purpose of a new drainage-system. The school itself presented no gross hygienic defect. The washing arrangements, with the epidemic once started, were favorable to its progress. The ventilation of some of the bedrooms was defective and the cubic space allotted to each boy could in some instances with advantage have been larger. Examination of the wall-papers and paints failed to disclose a source of irritation. In spite of hygienic measures, separate towels, etc., the disease spread widely, indicating either, in spite of the absence of discharge, that infection was playing a part, or that atmospheric agents(miasms) were at work, or both. Removal from the place facilitated recovery and did not lead to the infection of others. The outbreak, mild in character and unaccompanied by noticeable discharge or much visible redness, was of follicular type, and in cases in which recovery ensued no change in the

conjunctiva resulted. Mild, as opposed to more stringent, treatment proved the better, applications of silver nitrate retarding rather than promoting recovery. Fresh air and the best hygienic surroundings were of the first importance.

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## DERMATOLOGY.

UNDER THE CHARGE OF

LOUIS A. DUHRING, M.D.,

PROFESSOR OF DERMATOLOGY IN THE UNIVERSITY OF PENNSYLVANIA;

AND

MILTON B. HARTZELL, M.D.,

INSTRUCTOR IN DERMATOLOGY IN THE UNIVERSITY OF PENNSYLVANIA.

### The Therapy of Melanoma.

Lassar records a case of melanoma in which the internal administration of arsenic was followed by the disappearance of the tumor. The patient, a woman thirty-five years of age, had beneath the right breast a pigmented mole which, being rubbed by the corset stay, became the seat of a small tumor. Simultaneously the nævus began to grow peripherally. This small nodule was cauterized, probably with the galvano-cautery, but, instead of healing, renewed proliferation occurred. Because of this untoward result the patient absolutely refused to permit any further operative interference, and recourse was had to the internal administration of arsenic. Within the first three weeks involution began, but the patient neglecting treatment the tumor began to grow again. Upon the resumption of the arsenic retrogression again occurred. Under this treatment, continued for some time, the tumor completely disappeared; the pigment-mole remained, however. Unfortunately, owing to the refusal of the patient to permit the excision of a portion for microscopical examination, the diagnosis must remain in doubt. —*Dermatologische Zeitschrift*, Bd. 1, Heft 6.

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### The Management of Eczema.

In a paper read before the Section in Dermatology of the British Medical Association (*British Journal of Dermatology*, September, 1894), Malcolm Morris discusses the treatment of eczema, calling attention to the following points:

1. Are internal remedies required in eczema? If they are, what are the precise indications which should guide us in the use of them?

The author's view is that internal medication is not required unless some constitutional dyscrasia underlies the skin affection. In chronic eczema unaccompanied by constitutional dyscrasia, local treatment may be relied upon entirely. When the disease is acutely inflammatory, antimony is most valuable. In neurotic cases the sheet-anchor is opium; if this disagree, some

other sedative must be substituted. If the neurotic element shows itself as depression, quinine may be combined with the opium advantageously. If the discharge be abundant, belladonna may be combined with quinine. Phosphorus, strychnine, and arsenic are useful in selected cases, but the last must be used with caution or harm will be done instead of good. Cod-liver oil and general tonic treatment are indicated when malnutrition and anæmia are present; iron, however, is contraindicated when acute inflammation is present.

2. The influence of diet in eczema.

The author does not believe that diet has any influence except indirectly.

3. What are the principles on which the local treatment of eczema should be carried out? Speaking generally, every case should be treated as if it were of parasitic origin. The objects aimed at in local treatment are, first, to destroy micro-organisms; second, to protect the inflamed surface from the air and further microbic invasion; third, to soothe irritation. The principles on which the local treatment of eczema is to be carried out are as follows: Soothe when the inflammatory process is acute; stimulate when it is chronic; in either case keep the parts continuously under the influence of antiseptics.

4. How is the tendency to recurrence of eczema in those predisposed to the disease to be overcome? Is there any plan of alterative treatment by which this result can be brought about?

Change of climate is often beneficial in this direction.

As to the various waters the author sums up his conclusions as follows:

1. No spring known to him has any specific action on eczema.

2. Such virtue as sulphur waters externally applied possess is due chiefly to the parasiticidal action and partly to the temperature at which they are applied.

3. Such virtue as sulphur, chalybeate, or arsenical waters possess when taken internally is due to their action in quickening the processes of metabolism, increasing the number of red corpuscles in the blood, giving tone to the nervous system.

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### Resorbin and its Employment as an Ointment-base.

Ledermann (*Monatshefte für Praktische Dermatologie*, 1894, Bd. xix., No. 2) reports his clinical experience with this new ointment-base, which is a fat emulsion consisting of almond-oil, wax, a minimal quantity of gelatin and soap, and a small quantity of lanolin. It is distinguished by an extraordinary penetrating power in comparison with lard and vaselin. On account of the water which it contains it acts as a cooling ointment and diminishes itching and inflammation. It may be employed with benefit in pruritus, especially the senile variety. On account of its powers of penetration it is useful for the removal of crusts in eczema, psoriasis, seborrhœa, especially when combined with salicylic acid, sulphur, and resorcin. The scales of ichthyosis are readily softened by it and the feeling of tension relieved. It may be used advantageously in all artificial inflammations where there is an inclination to the formation of erosions and rhagades. Incorporated with suitable medicaments it is adapted to the treatment of acute and chronic eczema, lichen ruber, and psoriasis. It is especially suited to the

introduction of medicaments into the body as a base for iodine and iodide of potassium ointment. Mercurial ointment prepared with this base is well adapted to the treatment of syphilis.

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### The Treatment of Lupus.

In a paper read before the Dermatological Society of Great Britain and Ireland (*British Journal of Dermatology*, November, 1894), Stopford Taylor presents the following conclusions based on an experience in 250 cases of lupus vulgaris:

1. Excision should no longer be practised, except when lupus attacks a finger or toe and has proved rebellious to other treatment.

2. Scraping and cauterization with chemical caustics is the most satisfactory method of treating lupus of the trunk, extremities, and mucous membranes, and this plan may also be applied to the face when the disease is of trifling extent.

3. Scraping followed by the use of the thermo-cautery is quick, thorough, and efficacious, and has answered admirably in suitable cases of facial lupus, whether large or small areas have had to be dealt with.

4. Linear scarification is the remedy *par excellence* for extensive lupus of the face, where mutilation and scarring have to be avoided.

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### Infantile Syphiloid Due to Pityriasis Versicolor.

At a *séance* of the *Société Française de Dermatologie et de Syphiligraphie*, held July 12, 1894, MM. Fournier and Sabouraud reported a case of pityriasis versicolor of great interest from a diagnostic point of view. The patient was an infant, six weeks old, remarkably small and emaciated, having all the appearances of being the subject of hereditary syphilis. The lower extremities were covered with an eruption, confluent and arranged circinately, the general appearance at once awakening the suspicion of syphilis; and in fact, all who saw the infant regarded it as such. The eruption had commenced fifteen days after birth. At first it was limited to the ankles under the form of pustules, which became the centre of round red plaques. Suddenly it invaded the legs, and above all the thighs; in four days the whole external face of both thighs was covered with large red sheets, some of them rounded, others annular. The eruption was composed principally of erythemato-papular elements with whitish-gray centre. Of these elements the most represented circles of the diameter of a lentil to that of a 50-centime piece, even a franc. Some were isolated; the majority, however, by the coalescence of adjoining patches, formed plaques with polycyclic contents, one upon the upper part of the thigh being formed of four circles. Here and there were some very small papular elements upon which the epidermis was beginning to be elevated. Two peculiarities attracted attention: First, the color of the eruption. This color, at the periphery of the patches, was a bright red, florid, congestive, inflammatory, which disappeared upon pressure; it recalled the tint of certain erythemata.

Second, the central portions of some of these eruptive disks upon which one noticed the following: excentrically, a circular zone of a bright-red,

which included a central portion, desquamating and ashy-gray in color, recalling the surface of sand-paper. Apart from the eruption there were no other evidences of syphilis; nor did careful examination disclose any signs of this disease in either of the parents. In examining the mother of the infant several patches of tinea versicolor were found on the thorax and between the breasts. At the time of examining some of the scales from these patches scales from the lesions upon the infant were examined, and, to the great surprise of the reporters, spores and mycelium similar to those present upon the mother were found.—*Annales de Dermatologie et de Syphiligraphie*, 1894, No. 7.

## OBSTETRICS.

UNDER THE CHARGE OF

EDWARD P. DAVIS, A.M., M.D.,

PROFESSOR OF OBSTETRICS AND DISEASES OF INFANCY IN THE PHILADELPHIA POLYCLINIC; CLINICAL PROFESSOR OF OBSTETRICS IN THE JEFFERSON MEDICAL COLLEGE; CLINICAL PROFESSOR OF DISEASES OF CHILDREN IN THE WOMEN'S MEDICAL COLLEGE; VISITING OBSTETRICIAN TO THE PHILADELPHIA HOSPITAL, ETC.;

ASSISTED BY

WILLIAM H. WELLS, M.D.,

INSTRUCTOR IN OBSTETRICS IN THE PHILADELPHIA POLYCLINIC; ASSISTANT DEMONSTRATOR OF OBSTETRICS IN THE JEFFERSON MEDICAL COLLEGE.

### PERFORATION OF THE AFTER-COMING HEAD IN DIFFICULT CASES.

A case in which great difficulty was experienced at delivery by reason of the large size of the fœtus is described by DEMMER (*Centralblatt für Gynäkologie*, 1894, No. 45). The patient had lost children in previous confinements, and the size of the fœtus was such that although the body was delivered in breech presentation, the head could not be brought to the pelvis; as the child had perished, it was necessary to perform craniotomy upon the after-coming head. The operator introduced the fingers into the mouth of the child, and then drew the lower jaw strongly down with a blunt hook; he then passed a trephine through the mouth directly to the base of the skull, and opened the cranium. The trephine was then removed, and the blunt hook introduced into the aperture made by it; the brain broken down, and the head pulled down by the hook and delivered with comparative ease. The head was very large and hard; the length of the child was 62 cm. The mother made an excellent recovery.

### THE DISINFECTION OF THE HANDS, WITH A BACTERIOLOGICAL STUDY OF THE EFFICIENCY OF VARIOUS METHODS.

In a recent criticism upon the instructions given to midwives, in their text-books, regarding the cleansing of their hands, ZWEIFEL (*Centralblatt für Gynäkologie*, 1894, No. 47) criticises adversely the recommendation to use

carbolic acid to cleanse the hands, as corrosive sublimate is thought the more efficient antiseptic.

With a view to determine the practical efficiency of various antiseptics, REINICKE (*Ibid.*) has made trial of various antiseptics and methods as follows: To determine the power of resistance of bacteria and their spores, threads of silk were inoculated with the spores, and then exposed for two hours to steam at a temperature of 100° C.; these germs were also placed in boiling water for a half-hour, when it was found in both instances possible to produce colonies of bacteria from spores so treated. Reinicke first tried trimming the nails smoothly and short, and brushing the hands thoroughly for fifteen minutes in hot water and green soap; this, however, was found unsuccessful in destroying colonies of bacteria with which the hands had previously been inoculated.

A further trial was made by brushing the hands thoroughly five minutes in hot water and green soap, and then thoroughly scrubbing for four or five minutes with a 3 per cent. or 5 per cent. solution of carbolic acid; this method, however, was found inefficient in destroying all bacteria upon the hands. A further trial was made by brushing the hands five, eight, and ten minutes with warm water and green soap; a solution of corrosive sublimate, 1 : 1000, was then employed, the hands being brushed in it for two, three, and five minutes, and then in chloride of ammonium, 2 per cent. or 3 per cent. This method, however, also failed in removing all germs. Sublimate soap was then employed, but was soon proven to be thoroughly inefficient. A further trial was made in the use of chlorine water, but this again proved inefficient. A 1 per cent. solution of lysol was alike a failure in destroying bacteria. Tricresol was no more successful in destroying germs, and set up an eczema upon the hands which was very unpleasant. Reinicke found the best result in the use of corrosive sublimate with alcohol. A very excellent preparation to cleanse the hands is a mixture of green soap and alcohol. After the obstetrician has thoroughly brushed the hands with this mixture for not less than five minutes, the hands are again thoroughly brushed in alcohol for the same time, and then carefully cleansed with corrosive sublimate solution, 1 : 1000. This was found to be efficient in destroying germs. Among the many agents which have been chosen for the disinfection of the hands, sand soap has found favor with some. This Reinicke gave a thorough trial, only to fail to observe any benefit from its use.

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### BACTERIOLOGICAL EXAMINATION OF THE VAGINAL SECRETION DURING PREGNANCY.

With a view to determine the presence or absence of germs in the genital tract of the pregnant patient, where no possibility existed of contagion, KRÖNIG (*Deutsch. med. Woch.*, 1894, No. 43) has made a series of examinations in the Leipzig clinic. His cases numbered forty-eight, and his results show that the natural resisting power of the tissues is the same to both spores and cocci; there is, however, a marked difference in the time in which various organisms introduced from without are destroyed by the tissues. Streptococci were killed in a very short time. Two days is the longest time in which germs introduced within the body remained alive. Clinically speaking, the

genital tract may be considered aseptic in healthy women when from forty-eight to seventy-two hours have elapsed since the last examination.

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### The Prevention of Puerperal Septic Infection.

In the *Münchener med. Woch.*, 1894, No. 42, Hofmeier describes his results in his second thousand cases of labor as regards septic infection and the precautions necessary to avoid it. In his 2000 cases his entire mortality is six-tenths of one per cent., and from infectious disorders two-tenths of one per cent., and from infection arising in the hospital one tenth of one per cent. His morbidity rate in the 2000 cases was nine and three-tenths per cent., and of this but six and five-tenths per cent. arose from causes connected entirely with the puerperal state. Briefly stated, his precautions against sepsis consist in a preliminary prophylactic vaginal douche of corrosive sublimate solution 1:2000; this is repeated after each examination. Internal examinations are limited as much as possible, and intra-uterine manipulation is especially avoided. It is remarkable that the only cases of infection arising in the clinic were those in which it was found necessary to insert a hand or instrument within the uterus.

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### Walcher's Position, and its Practical Value in Obstetric Operations.

In the *Archiv für Gynäkologie*, 1893, Band 45, Heft 2, Wehle reports the interesting results at the Dresden clinic in employing Walcher's position during delivery in contracted pelves. This procedure consists in placing the patient upon her back at the edge of a bed or table, extending the thighs and allowing them to fall downward as far as possible. Walcher, writing on the subject in 1889 (*Centralblatt für Gynäkologie*, 1889, p. 892), asserted that the conjugata vera of a contracted pelvis varies with the posture of the patient, while Klein (*Zeitschrift für Geburtshülfe*, Band 21, S. 74) found that the true conjugate and diagonal conjugate undergo a change of five-tenths of a centimetre in various postures of the patient. These observations have been repeated by others, and lately by Wehle, who gives a tabulated list of twenty-five labors in contracted pelves. In these labors the patient was put in this position, and delivery was effected by version and extraction. None of the mothers died, and but two of them had fever during the puerperal period. Of the children, 80 per cent. survived. Of these twenty-five cases, seventeen had a conjugata vera of eight centimetres, and in these cases eighty-two and three-tenths per cent. of the children survived. Especial care was taken to maintain the membranes unbroken, that complete dilatation might be present before the beginning of extraction.

In a recent paper on "Posture in Labor," Jewett (*Brooklyn Medical Journal*, 1894, No. 11) states that he has examined puerperal patients, finding a gain in the antero-posterior diameter of the pelvis, when the patients were in Walcher's position, varying from one-half to three quarters of a centimetre; in four non-puerperal pelves measured upon the cadaver the gain in this position varied from four to six millimetres.

Fehling (*Münchener med. Woch.*, 1894, No. 44) has recently utilized Walcher's posture in three cases of contracted pelves, in two of which labor was

induced; he found that a broad band or girdle passed beneath the axillæ was of comfort to the patients, as the posture tended to cause them to slip down from the bed on which they lay. They could not maintain this posture with comfort longer than two or three hours. Fehling makes an estimate of a gain of from six to eight millimetres in the diameters at the brim of the pelvis by this procedure.

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### The Comparative Value of the Signs of Maturity in Newborn Children.

In the *Archiv für Gynäkologie*, 1894, Band 48, Heft 1, Frank describes fully the various signs upon which the question of a child's maturity at birth may be determined. From a review of the literature upon the subject, and from his studies in the clinic at Bern, he reaches the following conclusions: There is no one sign nor any one group of signs which point positively to the maturity of a newborn child; by studying each case for itself it is possible to arrive at certain conclusions regarding the proportionate development of the child. First in importance are the length and weight; next in value are the proportion between the circumference of the head and the girth about the shoulders. When the shoulder girth is greater than that of the head the child is almost invariably at term. If the circumference of the head be less than 32 cm., it is scarcely possible that the child is mature. A temperature lower than normal is also of value as indicating a prematurely born child, except in those rare cases where a child remains for some time partially asphyxiated. The growth of the finger-nails, the size of the epiphyses, and the presence of lanugo are of very little positive value. Data often given regarding the insertion of the umbilical cord, the time at which the cord separates, the weight of the placenta, the condition of the fœtal blood, and the size of the greater fontanelle, are of no value at all. In forming a positive opinion the physician will do well not to base it upon any one phenomenon, but to form a careful estimate of the entire group of phenomena present. It is oftentimes impossible to assert positively whether a child is at full term or whether a child is only viable.

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### Fœtal and Intra-uterine Rigor Mortis.

This rare phenomenon is described in a case reported by Lange, of Königsberg (*Centralblatt für Gynäkologie*, 1894, No. 48). The fœtus perished about four hours before birth, from asphyxia caused by the partial separation of the placenta, the attachment of which was in the lower portion of the uterus. The rigidity of the head and of the limbs occasioned difficulty at the moment of expulsion. Rigor mortis persisted twelve hours after the birth of the child. Post-mortem examination revealed ecchymoses in the tissues beneath the pleural and pericardial sacs. A small quantity of amniotic liquid had been aspirated into the air-passages, and the lymphatics of the abdomen were enlarged.

The literature of the subject embraces eighteen cases reported by Feiss (*Archiv für Gynäkologie*, Band 47, p. 391). An interesting medico-legal point is observed in the fact that rigor mortis occurring *in utero* passes off much more rapidly than does rigor mortis coming on in a child perishing at the

moment of birth, or soon after. The time at which fœtal rigor mortis may come on varies from a quarter of an hour before delivery to seventy hours before delivery. Cases have been observed in which this phenomenon began during the birth, and in which various groups of muscles could be detected in this condition while the child was passing through the mother's birth-canal. As causes producing this condition in the fœtus, we have the death of the mother, fever in the mother, abnormalities in the nutrition of the fœtal muscles, and the transmission of poisonous substances from the maternal to the fœtal blood. Stumpf observed, in 1886, a child born from an eclamptic mother with a high grade of rigor mortis. Sänger extracted a child by Cæsarean section, four minutes after the death of the mother, who perished from sudden hemorrhage. This child was also in a condition of rigor mortis. Dohrn performed Cæsarean section upon an eclamptic patient in the endeavor to save the fœtus, and extracted, in four minutes after her death, a child in a condition of rigidity, but whose heart beat twenty times to the minute for a short time. The child made no efforts to breathe.

In the management of labor in head presentations when this phenomenon is present, difficulty may be experienced in delivering the shoulders, while in breech presentation the physician will find it hard to bring down the arms.

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### Acetonuria During Pregnancy.

Vicarelli reports, in a thesis published at Padua, the results of his studies in 137 patients in Acconci's clinic. He found in nine cases acetone in the urine, and observed that these cases were those of dead and macerated fœtuses. The acetone disappeared by the fourth day of the puerperal period. In two of the cases the amniotic liquid contained acetone. In three cases where the clinical symptoms of acetonuria were present, acetone was found in but one. A very interesting observation was that made upon a patient eight months pregnant with polyhydramnios. Repeated examination by auscultation failed to reveal evidence of fœtal life. Repeated examination of the urine, however, disclosed no acetone. When the patient was delivered the child was living, but with almost an entire lack of the cerebral hemispheres. The child perished in two days, and hydro-thorax and hydro-pericardium were found which had obscured the fœtal heart-sounds and also the fœtal movements. Vicarelli inclines to the belief that the fœtal tissues after death undergo a fatty degeneration, and that acetone develops as fatty acids do from the decomposition of albuminoids.

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### A Carcinomatous Uterus Successfully Removed Three Days After Labor.

Noble, of Atlanta, Georgia, reports in the *American Gynecological and Obstetrical Journal*, 1895, No. 1, the case of a patient in labor, and suffering with carcinoma of the cervix. As the patient's condition made surgical interference impossible, the os uteri and vagina were cleansed and lightly tamponed with gauze. The patient was then put under the influence of morphine, and labor gradually proceeded, terminating spontaneously twelve hours afterward. The child, poorly nourished, died a few weeks later. From the time of labor the malignant surface was daily curetted and dressed antiseptically,

the patient's temperatnre dropping slightly in consequence. Three days after delivery it seemed possible to remove the uterus *per vaginam;* accordingly, the patient was vigorously stimulated, the uterus was packed with gauze, the ragged edges of the cervix trimmed away, the os rolled in upon itself and closed. As the bloodvessels of the uterus were considerably enlarged from the patient's pregnancy, compression forceps and clamps were used constantly. It was impossible to tie off the broad ligaments, as the tissues were so swelled and puffy that a ligature could not be managed, and the uterus was so large that no room was left to tie. Two clamps were placed upon the left side, and three upon the right, and artery forceps were used to catch bleeding points. Adhesions were found in Douglas's pouch, and the descending colon was also densely adherent to the posterior surface of the uterus. The peritoneum and tissues over the bladder were brought together by compression forceps, and the wound drained with gauze. Beyond the shock caused by loss of blood the patient bore the operation fairly well. The radial pulse became imperceptible, but the patient rallied under transfusion of salt solution. The clamps were removed in forty-eight hours, with the exception of one which was left twelve hours longer. With the exception of a small ureteral fistula upon the left side, the wound closed well by granulation; this fistula healed spontaneously in eight weeks.

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### The Treatment of Myomata of the Uterus Complicating Pregnancy.

Jessett, in the *British Gynecological Journal*, 1894, Part 39, reports the entire removal of a fibroid uterus containing a dead fœtus. He also cites a number of similar cases. After removing the uterus the ligatures were drawn down into the vagina, the peritoneal flaps were brought together, and the vagina was packed with iodoform gauze. The patient made a good recovery. He also reports a case in which he performed abdominal section, hoping to remove the fibroid and pregnant uterus. After the abdomen was opened it was found that the uterus was so adherent to surrounding structures that it would be impossible to remove it safely. The abdomen was accordingly closed. The patient made a good recovery, and the tumor diminished slightly in size.

In reviewing his study of the subject, Jessett concludes that in sub-peritoneal myomata the surgeon is justified in opening the abdomen and enucleating the growths when they are growing rapidly. In cases of multiple sub-peritoneal and interstitial myomata, extirpation of the uterus is indicated. In interstitial or submucous myomata the risk to the patient is greater as she proceeds to the end of the period. In cases where the tumor is upon the cervix only, it should be either enucleated or removed by *morcellement.*

In the discussion upon this paper, Routh reported cases in which a fibroid tumor at the lower portion of the uterus, and apparently obstructing labor, had given place spontaneously to the child, and labor had gone on without assistance. Haywood Smith thought that the element of danger and the need for operative interference would depend upon the extent to which the uterus was affected by fibroid change. Bantock had frequently observed normal labors in patients who had fibroid tumors. He thought that only the

largest tumors should render a case the subject of operation. Where multiple fibroids extensively alter the uterine wall the uterus cannot develop as the child grows, and abortion must result. R. T. SMITH described a case where Cæsarean section was performed, the patient perishing from hemorrhage. It was found that the placenta was implanted upon a portion of the uterus the seat of fibroid change, and that after the expulsion of the placenta hemorrhage could not be checked. He had also seen a case of miscarriage at the fifth month, where the placenta could not be properly removed. GODSON had frequently observed sub-peritoneal fibroids which did not interfere with labor. LEITH NAPIER called attention to the dangers of uterine rupture in labor occurring in fibroid uteri from degeneration of the uterine wall often present in these cases. Statistics showed that rupture of the cervix happened in 55 per cent. of the cases; of the body in 35 per cent., and of the fundus in 9 per cent. He recalled the case of a woman who had borne three children, who had a large fibroid on the posterior wall near the fundus. Each time there had been placenta prævia, and version was performed. After the third confinement the patient died.

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### ABDOMINAL GESTATION WITH DELIVERY OF A LIVING CHILD BY CŒLIOTOMY.

In the *British Medical Journal*, 1894, No. 1773, p. 1422, CULLINGWORTH reports a case of advanced extra-uterine pregnancy in an emaciated and ill-nourished patient who had borne one child and had one miscarriage. Seven months before admission to St. Thomas' Hospital her last menstruation had occurred, since which there had been symptoms of pregnancy, with several attacks of abdominal pain, followed by a discharge of bloodstained vaginal mucus. The abdomen was distended by a large, irregular swelling reaching to an inch above the umbilicus. Fœtal movements were felt and heart-sounds heard. The results of examination seemed to indicate a normal pregnancy; and the fact that the patient greatly improved in general health after admission to the hospital apparently confirmed the opinion. She left the hospital and returned about ten weeks afterward, soon after being seized with severe abdominal pain. She was evidently in labor, and the child was living. The finger could not be inserted into the cervix, and a sound in the uterus passed in three inches. She was accordingly subjected to abdominal section, and the fœtus was found in the peritoneal cavity enveloped in its membranes and in the lower portion by the remains of the ectopic sac. The membranes were incised, and the very small quantity of amniotic liquid allowed to escape The child was extracted by the head, separated from the mother, and soon cried lustily. The membranes were drawn out of the abdomen, and the greater part removed with scissors. The deeper portion of the sac was adherent, and the placenta was behind, below, and to the right. The amniotic cavity and the peritoneum were carefully sponged, dried, and the umbilical cord was again ligatured and cut short. The opening in the membranes was partially stitched with eight catgut sutures, and the abdominal wound was closed with nine deep and four superficial silkworm-gut sutures. No douche was employed, and no drainage-tube was used. Very little blood was lost, and the patient sustained but little shock. The child was a male, measured nine-

teen inches in length, and weighed five pounds. It was well developed and at the eighth month of gestation. The patient did well for about three weeks, when, on the twenty-fourth day, a chill occurred, followed by vomiting. The patient had fever and rapid pulse. On the twenty-sixth day the abdomen was reopened to remove the placenta, which presented in the wound. About eight or ten ounces of purulent fluid escaped from the amniotic sac; the placenta was cut away, and seemed to have been adherent to the posterior surface of the bladder and the uterus. The right broad ligament was tied with silk ligatures. A hot douche of boric acid solution was given, and a small portion of adherent omentum was ligatured and removed. The wound was closed with drainage. The patient collapsed, and died seven and a half hours after the operation. On examining the placenta, the greater part of it presented the normal honeycombed appearance without suppuration. The amnion had a slightly unpleasant odor, and was readily stripped off the fœtal surface of the placenta. The umbilical cord was soft and slightly fetid, and on opening its vessels they contained soft clots, becoming purulent. Upon post-mortem, the stump was found firmly secured by ligature which had been made in removing the placenta. The pregnancy had been in the right tube, which had ruptured. There was no evidence of septic peritonitis. There had been at some time adhesive peritonitis around the left Fallopian tube. In summing up his case, Cullingworth would not object to the method of treatment employed; he would, however, in another case allow the placenta to empty itself as far as possible through the cut cord before applying the ligature. He would also cut the cord as short as possible, and strip away as much of the amnion from the placenta as could be effected without violence.

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## GYNECOLOGY.

UNDER THE CHARGE OF

HENRY C. COE, M.D., M.R.C.S.,

OF NEW YORK.

### Gonorrhœa in the Female.

Glünder (*Inaugural Dissertation*) examined eighty-seven sterile married women with reference to the influence of gonorrhœa in causing the condition. In sixty-three he obtained a clear history of former infection.

Charrier (*Inaugural Dissertation*) states that gonorrhœal peritontitis is characterized by the fact that it is confined to the true pelvis, and results in the formation of extensive adhesions. It is at first nearly always limited to one side, but soon involves the opposite side, menstruation being an active factor in spreading it. Peritonitis usually develops in the second or third week after the primary infection. Gonorrhœal may be complicated with puerperal septic peritonitis. Experimentally the author was unable to produce a pure infection of the peritoneum in animals by injections of pus contain-

ing gonococci. In spite of these negative results he still believes that they produce a specific form of peritonitis in the living subject.

RESNIKOW (*Centralblatt für Gynäkologie*, No. 32, 1894) reports an interesting case of gonorrhœal rheumatism in a young woman (previously a virgin) which developed four days after marriage with a man having an acute urethritis, and before any local evidences of gonorrhœa appeared. The affection was confined to one knee-joint, and was unusually severe, persisting for two months. The writer believes that the specific bacteria may have been absorbed through the raw surface left after laceration of the hymen, and that the case furnishes a possible argument in favor of the theory that gonorrhœal arthritis is a wound infection.

COLOMBINI (*Centralblatt für Gynäkologie*, No. 32, 1894) has found that exposure to the action of a three per cent. solution of ichthyol for five minutes hinders the development of gonococcus colonies. Applying this fact in the treatment of specific vaginitis, he treated thirty cases with applications of five and ten per cent. glycerin solutions. The same strength was used within the urethra and the uterine cavity in all cases with the most satisfactory results.

JANET (*Nouv. Arch. d'Obstétrique et de Gynécologie; Centralblatt für Gynäkologie*, 1894, No. 50) is extremely pessimistic regarding the radical cure of gonorrhœa. In some cases he thinks that is impossible. He believes in prompt abortive treatment with permanganate of potassium, which he has found to be quite satisfactory. That the disease is so much more obstinate in the female is probably due to the influence of menstruation, which renders the genital tract more susceptible to fresh infection. Two months (!) after infection is stated to be the shortest time which a man should allow to elapse before he again indulges in coitus, or marries.

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### VAGINAL DRAINAGE IN CŒLIOTOMY.

MOULONGUET (*Arch. Journ. de Chir.; Centralblatt für Gynäkologie*, No. 50, 1894) pleads for the adoption of vaginal in the place of abdominal drainage, since it is in accordance with the natural law of gravitation. Combined vagino-abdominal drainage is unnecessary. Iodoform gauze is the best drain, since it prevents infection from the vagina; tubes become clogged, and also compress the bowel. Drainage through Douglas's pouch is indicated in cases of pelvic suppuration, extensive adhesions, and partial hysterectomy; also as an index of oozing when hemorrhage is feared.

[While we coincide with the writer in his belief that drainage *per vaginam* is the ideal method, we do not think that the iodoform gauze drain can be depended upon to indicate the presence of hemorrhage after abdominal operation.—H. C. C.]

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### DRAINAGE OF DOUGLAS'S POUCH.

BOISLEUX (*Centralblatt für Gynäkologie*, No. 50, 1894) concludes an extended paper on this subject with these deductions: Draining of Douglas's pouch by means of rubber tubing is indispensable in all cases in which the peritoneal cavity is opened *per vaginam*, except after total extirpation of the uterus, when a sufficient channel is left for the escape of purulent fluids. Such drainage should be employed in all cases of pelvic suppuration. Due

care must be exercised to prevent subsequent infection through the tube, by keeping the vulva protected with antiseptic gauze. If these precautions are observed, there are few abscesses which cannot be opened per vaginam without extirpating the uterus. Tubes and ovaries which are only slightly diseased should be spared as far as possible.

The writer believes that the peri-uterine adhesions can be separated more easily by the vaginal than by the abdominal route. The statement that adherent adnexa can be enucleated more easily when they are actually seen does not carry weight, since such organs must usually be pulled out from their beds before they can be seen, so that after all the finger is really the "eye of the gynecologist."

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### Advantages and Disadvantages of Drainage by Mikulicz's Method.

Condamin (*Province Méd.; Centralblatt für Gynäkologie*, No. 50, 1894) believes that the Mikulicz tampon is the most efficient means of arresting hemorrhage in cœliotomy when others fail. But, after the separation of extensive adhesions, or where it is desirable to promote the encapsulation of septic foci, gauze-strips are preferable, since the Mikulicz tampon cannot be packed into small cavities like loose gauze. When the tampon is used considerable care must be exercised not to cause intestinal obstruction from undue pressure. Another disadvantage is the greater liability to ventral hernia.

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### Salipyrin in Uterine Hemorrhage.

Kayser (*Centralblatt für Gynäkologie*, No. 51, 1894) reports sixteen cases of uterine hemorrhage (not due to pregnancy or malignant disease) which he treated with salipyrin in doses of fifteen grains repeated thrice daily. In three cases of metrorrhagia it had no effect, but in twelve of menorrhagia the flow was checked to a marked degree. The drug seems to be of special value in climacteric hemorrhages. There were no unpleasant consequences aside from ringing in the ears.

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### Pregnancy Mistaken for Ovarian Cyst.

Reverdin (*Gaz. Méd. de Paris*, No. 9, 1894), with admirable candor, reports this error in diagnosis, which seems to have been quite excusable. He had removed a large ovarian cyst from the patient a year and a half before. She returned at the end of that time with a fluctuating abdominal tumor, most prominent in the right side. She had menstruated at irregular intervals since the operation. On opening the abdomen numerous firm intestinal adhesions were found, in the separation of which the gut was so injured that it was necessary to resect five inches. On exposing the tumor it presented the ordinary appearance of a cyst, and was punctured with a trocar, a quantity of turbid fluid being removed. When the trocar was withdrawn a loop of umbilical cord appeared in the opening. Hysterectomy was performed, and the patient was discharged, well, at the end of two weeks. Pregnancy had advanced beyond the fourth month, and there was marked

hydramnios, the presence of the latter condition and the adhesions having led to the error in diagnosis.

[It is to be regretted that more cases of this character (and who has not narrowly escaped the same mischance?) have not been reported, since they would serve as a valuable guide to the profession in the avoidance of similar errors. The reporter loses nothing by his frank confession, but rather wins the increased respect of his *confrères*.—H. C. C.]

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### Disappearance of the Uterine Cavity After Curettage.

Fritsch (*Centralblatt für Gynäkologie*, No. 52, 1894) reports the case of a primipara, aged twenty-five years, who was curetted several weeks after delivery on account of persistent hemorrhage, and remained in good health for over a year afterward, except that she never menstruated, nor did she have any molimen. When seen by the writer she appeared to be perfectly well and had had no disturbances referable to the amenorrhœa or suggestive of a premature climacteric. Examination showed an infantile uterus, without enlargement or tenderness of the ovaries. As it was impossible to introduce a sound through the small dimple which represented the os externum, the latter was incised, when a probe could be passed for a distance of four-fifths of an inch, beyond which point no further progress could be made except with the aid of a knife. The probe was then passed two inches further, when its point could be felt at the fundus by external palpation. An attempt was made to dilate the narrow tract with tents and gauze, but soon after they were removed the condition was the same as at first, and had remained so six months later. The writer infers from the history that the curettage had been performed so vigorously that a considerable portion of the muscular tissue of the uterus was scraped away, when the opposite raw surfaces became adherent. In this connection he calls attention to the fact that removal of the uterus alone in young women produces the menopause more certainly than when the ovaries and tubes are extirpated and the uterus is left.

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### Total Extirpation by the Vagina for Lesions of the Uterine Appendages.

In a paper with this title (*Amer. Journ. Obstetrics*, November, 1894) Jacobs, of Brussels, makes a strong plea in favor of vaginal hysterectomy. His total mortality in 255 cases is only 1.96 per cent. Although his operations were originally confined to cases inoperable by the abdominal method, he now regards total extirpation *per vaginam* as the ideal method for all cases in which it is necessary to remove both tubes and ovaries. Among his patients were many who had previously submitted to palliative operations, or even to abdominal castration, without relief. As regards the relative danger of the two operations, it is stated that the mortality is more than one per cent. less after the vaginal, and even this difference is unfairly stated, because so many more difficult cases belong under the latter category. The objections to vaginal extirpation are raised mostly by those who are not practically familiar with it. It is in those cases in which the pelvic organs are matted together by firm adhesions, where the abdominal surgeon is often compelled

either to abandon the operation or to leave it incomplete, that the vaginal method gives the most brilliant results. Even when it is impossible to break up all the adhesions and to remove the adnexa, collections of pus may be opened and drained, and the adhesions often soften and disappear, while pain disappears. To leave the uterus after removal of the adnexa is to leave the patient incompletely cured, so that a secondary hysterectomy may be necessary.

Unilateral extirpation of the adnexa *per vaginam* may be readily performed with the aid of forcipressure, even during pregnancy. It may be necessary to do a secondary hysterectomy. Vaginal hysterectomy by morcellation is admirably adapted to the removal of fibroids, even when the tumors extend to the umbilicus. Complete prolapse of the uterus in women of advanced age is thus treated by the writer, extirpation being supplemented by pelvic operations upon the vagina.

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### Physiology and Pathology as Illustrated by Menstruation and Gestation.

Barnes (*Glasgow Med. Journal*, December, 1894), in an inaugural address on this subject, concludes that gestation and menstruation throw much light upon the etiology, nature, and treatment of many diseases. The phenomena best explained in this way are the influence of increased nervous and vascular tension in the production of new tissue; absorption of the latter, the results of hemorrhage and of blood-changes and metabolism. Those who neglect this study are apt to attribute all disorders of functions and secretions to some actual organic change, instead of referring them to the depressed condition of the whole system. The author concludes with the suggestion that it is only those who combine gynecological with obstetrical observations who are in the best position to observe and generalize on this subject.

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## PÆDIATRICS.

UNDER THE CHARGE OF

LOUIS STARR, M.D.,

OF PHILADELPHIA;

ASSISTED BY

THOMPSON S. WESTCOTT, M.D.,

OF PHILADELPHIA.

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### Biting the Nails.

Bérillon (*Medical Week*, 1894, p. 357) reiterates his previously expressed opinion that onychophagia and similar habits are generally associated with degeneracy. The frequency of nail-biting varies greatly in different institutions; in some, two or three out of every ten children are addicted to this habit. A careful examination invariably reveals signs of degeneracy. Such children are usually less healthy in appearance than others, presenting de-

formities of the skull and anomalies of the teeth and ears; and they often exhibit a marked antipathy to physical exercises and games requiring effort. They write poorly and show marked inferiority in manual dexterity. They are slow to learn, and are incapable of continuous application; in short, they always exhibit an inferiority in some direction or other. The usual corrective measures prove unavailing, in the majority of cases only hypnotic suggestion seeming to be capable of effecting a cure.

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### The Diagnosis of Sporadic Variola.

In a note on the spread of infectious diseases, Niven, Medical Officer of Health for Manchester (*Lancet*, 1894, ii. p. 192), emphasizes the importance of the recognition of slight cases of smallpox. The frequent mistakes between smallpox and chicken-pox can be avoided by attention to the following rules: (1) Adults rarely have chicken-pox. If two adults appear to have chicken-pox in one house, the medical attendant should suspect smallpox. (2) Properly vaccinated children under seven years of age very rarely have smallpox. (3) With few exceptions, children attacked with chicken-pox experience no initial sense of illness. With smallpox they almost always have well-marked illness. (4) The distribution of the eruption is different. In slight smallpox the eruption is almost always on the face and limbs, sparing the abdomen and front of the chest. In chicken-pox there are generally a large number of pocks on the front of the chest and abdomen. (5) The eruptions are different in character. To mention no other points, the eruption of smallpox is tolerably uniform in size and round in shape. The eruption of chicken-pox is very variable in size, and many of the pocks, on the body especially, are of oval shape. (6) The eruption of chicken-pox is itchy in a great many instances; that of smallpox is, at first, not so.

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### Cases of Infantile Diarrhœa Complicated by Acute Nephritis.

In a short note Turner, of Liverpool (*The Practitioner*, October, 1894, p. 263), reports three cases of infantile diarrhœa complicated by fatal acute nephritis. All three children were aged under a year, and had suffered from diarrhœa "for more than a fortnight." Another fact of interest is that they were all rickety children, but their family histories showed nothing noteworthy. They were all seen for the first time within a period of four days. The treatment adopted was mainly that recommended by Dr. Burney Yeo in his *Manual*. Under this treatment all three patients seemed to be improving; but on the fourth day patient No. I. was noticed to have swollen feet, and was puffed under the eyes. On the following day this was more marked, and the mother noticed a diminution in the amount of urine on the napkins. Despite appropriate treatment, the child died on the fourth day with the usual symptoms of uræmia. It was noted that coincidentally with the œdema of the feet and legs there was an improvement in the diarrhœa, and bile-staining was almost absent. Patient No. II. ran a very similar course; and here a small sample of urine obtained was found to be albuminous. In this case death took place on the fifth day after the appearance of œdema. Patient No. III. lingered a week, and before the end œdema was extreme. It may be stated that on the first appearance of renal symptoms the minute doses of

brandy were stopped, and ether or ammonia given instead. In all three cases the heart's action was good till within a few hours of the end. Scarlet fever at any time previously was positively excluded. The author is inclined to exclude the influence of exposure to cold and of the drugs used in treatment, and asks whether the ptomaïnes elaborated in the intestine might not have irritated the kidneys after the free discharge by the bowel had lessened and thus thrown more excretory labor upon the kidneys.

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### Acute Gonorrhœal Vulvo-vaginitis and Urethritis in an Infant at Birth.

Morgenstern (*Medical Record*, February 2, 1895, p. 143) reports an interesting case under this title. The child was first seen at the age of three weeks, when it was stated that urine had been voided scantily since birth, the little that was passed coming away a drop at a time. On local examination nothing could be seen, except possibly a slight reddening of the parts. A probe introduced into the urethra encountered no obstruction, and the bladder was found not to be distended. One week later the mucous membranes of the labia majora, nymphæ, vestibule, and anterior portion of the hymen were reddened and engorged and exquisitely tender, and a thick, creamy, muco-purulent discharge was observed. More urine than formerly was voided, but the quantity was still very small. The mother admitted that she had been treated for a long time for a vaginal discharge similar to that from which the child was suffering. As the child slept with the mother, the chances of direct infection were thus most favorable. Gonococci in great numbers were found in the discharge. Under ordinary appropriate treatment a cure was effected in a short time.

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## PATHOLOGY AND BACTERIOLOGY.

UNDER THE CHARGE OF

JOHN SLADE ELY, M.D.,

PROFESSOR OF PATHOLOGY IN THE WOMAN'S MEDICAL COLLEGE OF THE NEW YORK INFIRMARY; ASSISTANT IN PATHOLOGY IN THE COLLEGE OF PHYSICIANS AND SURGEONS; PATHOLOGIST TO BELLEVUE HOSPITAL.

### The Pathology of Exophthalmic Goitre.

We would call the attention of our readers to a carefully written article upon the pathology and treatment of Graves's disease by Putnam in *Brain* (*September*, 1894, p. 214), in which the various theories of its pathology are discussed in considerable detail. Three such at present claim adherents: (1) That the symptoms of Graves's disease are mainly toxic in origin and are due to excessive or perverted secretion by a diseased thyroid gland; (2) That they are purely neurotic in origin; and (3) That they are more or less reflex in origin and due to irritation of the thyroid and cervical nerves.

After reviewing the evidences, Putnam concludes as follows: "To sum the whole matter up we have two questions to bear in mind as regards the

etiology of Graves's disease: First, what is the underlying predisposing cause? Second, what is the mechanism by which this cause acts? The underlying cause I believe to be an undue excitement of the quasi-physiological arrangement called into play frequently as a part of emotional excitement. This arrangement represents the channel into which emotional excitement naturally pours itself after rising to a certain height, and its anatomical centre is in the medulla oblongata and related parts.

"As regards the modes in which this nerve arrangement underlying the symptoms of Graves's disease is actually disturbed they may be many, and among them there seems it may be that poisoning by the thyroid secretion is one active agent. This is, however, a matter of some doubt, because we have no right to assume that if the symptoms of Graves's disease are habitually due to the toxic action of the thyroid secretion, they are still capable of being excited in the same form without the aid of that secretion; and if we can get, as it appears, the greater part of these symptoms under *quasi*-physiological conditions, then it would seem unnecessary and somewhat gratuitous to invoke the thyroid secretion as an habitual cause of them in disease. Nevertheless, it would appear that the physiological action of the thyroid extracts does excite a series of symptoms somewhat resembling those of the affection with which we are dealing."

The same number of *Brain* (p. 246) contains a critical digest of the recent literature on exophthalmic goitre by MAUDE, at the close of which he says: "It is obvious that all over Europe there is a gradual growth of the opinion that this symptom-complex is due to the production (or non-elimination) in the thyroid itself of some toxin, which acts on the whole nervous system, even to the periphery, though the brunt of its action falls on the vasomotor centres of the medulla and some neighboring centres. . . . . The question of the exact *rôle* played by the thyroid change is difficult; it is clear that all morbid changes in the thyroid are not operative to produce Graves's disease, but all the cases (in which the gland has been properly examined) show two common factors—cell proliferation and diminution of colloid. Even so, we are in the dark as to whether this morbid change is primary or secondary to some vasomotor disturbance elsewhere, and also as to whether the alternation in thyroid secretion will produce the same effect in a healthy nervous system; probably some nervous systems are more susceptible than others to the toxic influence, just as they are to alcohol and lead; in fact, the susceptibility of young women to plumbism and Graves's disease is strikingly similar."

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### CYCLIC ALBUMINURIA.

PAVY applied the name "cyclic albuminuria" to certain rather unusual forms of albuminuria occurring intermittently in apparently healthy individuals. The albumin was commonly found in the day urine, but not in that secreted during the night.

An interesting case of this condition has recently been investigated by TEWES (*Arbeiten aus der pädiatrischen klinik zu Leipzig, Cf. Berl. klin. Wochens.*, 1894, No. 17, 410). The patient was an apparently healthy boy of ten years. The chief object of Tewes's investigation was to determine the influence of muscular activity upon the albuminuria. So long as the boy lay quietly in

bed albumin was absent from the urine, but even though he remained in bed and in the horizontal position, muscular exertion always caused its appearance. Similarly, when up and about as usual, added muscular exercise in the shape of gymnastics always materially increased the amount of albumin present. On the other hand, the quantity of albumin excreted bore no relation to the quantity of nitrogenous food taken. The albumin found in the urine was determined by analysis to be always serum albumin.

### The Identity of Cancrum Oris with the Hoof and Mouth Disease in Cattle.

Siegel (*Deutsche medicinische Wochenschrift*, 1894, No. 19) concludes his article relative to the identity of cancrum oris in man and the "hoof and mouth" disease in cattle. In a number of post-mortem examinations made by him in men and children affected with aphthous sores in the mouth a peculiar bacillus was found. An examination of a number of dead cattle showed the same microbe. In the internal organs during the acute stage of mouth disease is found a specific bacterium, and by inoculation with this other animals can be similarly infected. The bacterium is found especially in the liver and spleen, generally during the first ten days, seldom later. It is rarely seen in the blood. The bacillus is described as a short rod or linked coccus from 0.5–0.7 $\mu$. in length. The coloring in its middle part is much fainter than at its end. This coloring is unique, and prevents its being mistaken for other bacteria. It is not movable. This bacillus grows in gelatin without liquefaction on plates in the form of colonies, with sharp blue and white edges, which later change to a yellowish shiny hue. In stab or scratch cultures no liquefaction occurs, and on the surface can be seen a soft bluish film. It grows also on potato, blood-serum, and bouillon. The growth is comparatively slow. Gram's staining is unsuccessful. Doves, cattle, pigs, and goats are suspeptible to inoculation. The results, at least the production of external aphthous manifestations, are not uniform.

## HYGIENE AND PUBLIC HEALTH.

UNDER THE CHARGE OF

EDWARD F. WILLOUGHBY, M.D.,

OF BOSTON;

AND

CHARLES HARRINGTON, M.D.,

INSTRUCTOR IN MATERIA MEDICA AND HYGIENE, HARVARD MEDICAL SCHOOL.

### Jewish and Christian Butchery.

In 1891 Dr. Dembo, of St. Petersburg, was commissioned by the Russian Government to report on the various methods of slaughtering animals practised in the different countries of Europe, from the humanitarian and the hygienic points of view.

The results of his inquiries were published last winter, and have been translated into several languages; while at Berlin they have been verified scientifically and practically by Dr. Krüger in the laboratory, and by Mr. Hoffmann, the Director of the Municipal Slaughter-houses, which are well known as the most perfect in the world. The methods in question are: (1) The Jewish Schechita, or complete severance of the carotids and jugulars, and consequent rapid withdrawal of the greatest possible volume of blood. (2) The Gentile methods, in which attempts are made to deprive the animal of consciousness by (*a*) stunning or (*b*) by pithing; the former including the English hammer and pole-axe; Brunneau's mask which, besides blindfolding the ox, holds in position a nail which is driven through the skull by a blow from the hammer; and Sigmund's, in which a percussion shot is substituted for the nail.

Decomposition begins sooner in the less stable tissues, and first of all in the blood; the more rapidly and completely, therefore, the vessels are evacuated the longer does the meat remain fresh and wholesome. The entire extinction of life is marked by the loss of electric irritability and the appearance of *rigor mortis*, due to the action of lactic acid on the myosin. Dr. Krüger found that in a number of rabbits, some of which were killed after the Jewish method, and others by stunning followed by "sticking," the average time after death at which rigor set in was one hour and ten minutes in the former, and two hours and thirty-five minutes in the latter; decomposition commencing on the thirteenth and eighteenth days respectively, the temperature having been meanwhile maintained between 3° and 7° C. (37.5°–44.5° F.).

The vasomotor paralysis that follows stunning tends to retain the blood in the dilated vessels; while in the *Schechita* arterial tone is unimpaired, the rapid reduction of pressure withdraws fluid from the tissues, and the flesh is as firm in two hours as after other methods in ten.

Against these palpable advantages of the Jewish method the charge of cruelty has been persistently urged, although it must be evident that the sudden cutting off from the brain of its blood-supply, except the small quantity brought by the vertebral arteries, must involve almost instant loss of consciousness. The epileptiform convulsions, which have been taken to indicate intense agony, are the consequence of cerebral anæmia and evidence of unconsciousness. Even the movements of the pupil on being touched, which may be observed fifteen seconds after the *Schechita*, are merely reflex; it is well known that fowls will run and ducks swim without their heads, and Dr. Dembo, by stimulating the appropriate points, has induced the trunkless head of the ox to open its mouth and protrude its tongue, all suggestion of consciousness being absurd.

Indeed, there is reason to believe that a beast slaughtered in the Jewish manner does not retain consciousness for more than from three to five seconds, and it is very doubtful whether it feels pain for half that time.

On the other hand, it is seldom, indeed only by a lucky chance, that the ox falls under the first blow of the hammer, five or six being about the average number required, and then it must not be forgotten that unconsciousness does not always accompany motor paralysis.

But barbarous as pole-axing may be, Dr. Dembo has proved that the French method of pithing is simply diabolical.

The knife is commonly supposed to divide the medulla above the decussa-

tion, thus paralyzing every faculty simultaneously. This, however, is well nigh an anatomical impossibility, and, as he has demonstrated by numerous post-mortem examinations, it is the cord only that is actually reached. Motor paralysis is complete, but circulation and respiration proceed as before, and consciousness remains intact long after the process of flaying, etc., has commenced.

Mr. Hoffmann has already introduced the *Schechita* into the Municipal Slaughter-houses at Berlin, and is supported in a report on the question by no fewer than fifty University professors, one hundred veterinary surgeons, and a large number of master butchers throughout the empire.

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### Smallpox and Vaccination.

Dr. Joseph Priestly gives some interesting facts concerning smallpox in an ill-vaccinated community (*British Medical Journal*, August 18, 1894). Of 362 children who passed through the Leicester quarantine, only a fourth were vaccinated. There were 347 cases of smallpox at Leicester, and among them was not a single case of a vaccinated child under ten years of age. Among these cases were fifteen which showed forcibly the beneficial effects of primary vaccination extending into adult life. The beneficial effects of vaccination are well shown by the comparative length of stay in the hospital; the average stay of the unvaccinated cases was 44.2 days; that of the vaccinated was 28.6—a difference of more than fifteen days. The average stay of those who had been vaccinated was even less—26.8 days, while those who had had a previous attack were confined only two weeks. The beneficial effects are shown again in mitigating the severity of the attack. Among the vaccinated cases the percentage of severe attacks was 11.20 against 88.70 for the unvaccinated. In nearly two-thirds of the unvaccinated cases complications arose in the course of the disease, whereas of the vaccinated and revaccinated cases less than a fourth were complicated.

Dr. Hill, of Birmingham (*British Medical Journal*, August 11, 1894), reports that of 651 cases of smallpox occurring in the previous quarter at Birmingham, no less than 560 were vaccinated persons. Of these latter, 26 died —a death-rate of 4.6 per cent. There were 63 unvaccinated cases with 18 deaths—a death-rate of 28.6 per cent. The remaining 28 cases were of persons concerning whom there were doubts as to the question of vaccination. Five of these died— a mortality of 17.9 per cent.

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All communications should be addressed to

Dr. Edward P. Davis, 250 South 21st Street, Philadelphia, U. S. A.

Or

Dr. Hector Mackenzie, 59 Welbeck St., Cavendish Sq., London, W., Eng.

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